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AGRICULTURE, SHIKAR & TRAVEL

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Contents.

No. 5—May, 1893.

Page.

I.—Original Articles and Translations.

On Forest Administration, by "Coupe de regénération" 165
Deodar in Kulu, by Mian Moti Singh ... 168
The commutation of privileges in Bahraich, by B. A Rebsch 174
A new fodder for cattle, (translation) by "A. F. G." 178

II.—Correspondence.

The "Blazer" question 180

III.—Official Papers and Intelligence.

A second note on the Potato disease in the Poona District and elsewhere 183

IV.—Reviews.

Annual Forest Administration Reports for 1891-92 in the Punjab, Baluchistan, Ajmere and Berar ... 186
Notes on Forest Entomology 192

V.—Shikar.

A trip to Bara Banqahal by F. O. L. (concluded.) ... 196

VI.—Extracts, Notes and Queries.

Sir Edwin Arnold, the Monkeys and the Cocoanuts ... 198
Corean paper making 199

VII.—Timber and Produce Trade.

Churchill and Sim's Circular, April 2nd, 1893. ... 200
Market Rates of Products 200

VIII.—Extracts from Official Gazettes.

Appendix Series.

Kut *(The Costus)*

X

THE

INDIAN FORESTER.

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On Forest Administration.

The article "On Forest Settlement and Administration," which appeared in the March number of the *Indian Forester* deprecates the arrangement adopted in Madras of allowing Revenue Officials a large share in the administration of forests.

As a Madras Forest Officer who has been in charge of a district for the past 10 years, I say that I have found but few of the defects pointed out by "Futaie."

Futaie says that "the control of the Reserved, as well as of 'the Protected, is rapidly slipping, or has already slipped, away 'from the Forest to the Revenue Department." Here is the chief point in the whole article, and I propose to discuss it so far as Madras is concerned.

The management of forests in Madras in undertaken by

(1). Government.

(2). Board of Revenue advised by Conservator.

(2). Collector of the District advised by District Forest Officer.

The latter has the chief management and working of the forests, of course, subject to regulations laid down by the two former. It is with the latter I propose first and chiefly to deal.

The Collector in Madras is, of course, *the* chief of the District, not only in the Revenue, but also in the Forest, Magisterial, Police, and almost every other Civil Department.

The question now arises, "Does the Collector stand in the way 'of the District Forest Officer, or does he help him?" I have been District Forest Officer under six Collectors, and can confident-

ly state that the latter is the case, at all events with the present generation of Collectors. The Collector of the present day thoroughly understands that the reservation of forests is beneficial to the people, and that the future agricultural interests are furthered by restrictions at present of so-called privileges, such as promiscuous fellings in the forests, excessive grazing, grassfiring, forest clearings and even the imposition of fees.

The present day Collector is not afraid of dissatisfaction occurring amongst the people in regard to Forest measures, provided those measures are not suddenly and immoderately introduced. Thus, in the course of a few years, thousands of acres may be closed to felling or to grazing without fuss or murmur if done gradually; but, if done suddenly and all at once, this closure would probably cause grave dissatisfaction, and even riots. In these matters, the Collector is the Conservative, as compared with the Forest Radical: the brake on the coach to prevent its running down hill too fast.

It is absurd to say that the Collector only regards agricultural interests, as he is the head of the Agricultural Department, and does not regard Forest interests except from an agricultural point of view; just as much as it would be to say that he does not regard magisterial interests, except from an agricultural point of view.

It is equally absurd to say that the Revenue Department has been "bribed to take right action, &c." Collectors are being shown that forest projects are interesting, and are interested accordingly, if matters are properly and thoroughly explained to them. They are being "physically educated up to a rational and 'impartial treatment of forest affairs." The question is rather, whether the average forest officer is "educated up to a rational and 'impartial treatment of agricultural and magisterial affairs." I think not, I think that his zeal over forest matters biasses him on that side; and that he is not interested in agricultural matters. Perhaps if he were "bribed to take a right action by the concession 'of a larger share in the management" of agricultural and magisterial affairs, he might see that he has been so biassed.

The arrangement of the Forest Officer being an assistant to the Collector has a double effect. *Firstly*, it is my experience that the Collector is almost invariably willing to leave purely technical matters to his forest assistant; he is willing to learn all that he can about forest management, provided that the Forest Officer proceeds with tact and does not setto work either to lay down the law or to use long technical phrases, with which the Collector has no acquaintance; he is willing to listen to his District Forest Officer's arguments and be guided by his opinion, provided he has no weighty argument in return. *Secondly*, the District Forest Officer hears the Collector's views on the subject, taken if you will, from an Agricultural or Magisterial stand point; and he consequently sees both sides of the question.

The result is that Collectors take a proper interest in forest matters, and that Forest Officers take a more unbiassed view of their projects, which would not happen if they were independent of each other.

There are other ways in which the coalition strengthens the hands of Forest Officials. *Firstly*, the Department being under-officered, we constantly find young Assistants or Extra-Assistants of one or two years' standing at the head of affairs in a District. Presuming that this young Assistant is zealous in his work, he longs to make innovations and improvements, pooh-poohs custom, considers that the thief of a head load of firewood is a greater villain than a house breaker, or swindler, &c. &c. : who could better restrain him from making himself and the department a laughing stock than a kindly Collector, who knows enough about young men to do it without hurting his Assistant's feelings ?

Again, without the Collector's authority, Tahsildars have a nasty way of acquiescing in proposals to get a thing done, but six months or so afterwards furnishing a most plausible reason why it should not be done. The time lost is generally, by Europeans, considered valuable.

Again, the Collector being head of the Local Fund Board can often have roads and buildings, most useful to the department, constructed from Local Funds.

Again, the Collector, when visiting localities where Subordinate Magistrates, reside, can, as District Magistrate, explain to such Subordinate Magistrates that forest offences should not be treated as trivial one or two anna offences.

Thus, a great deal can be gained for the Department by the Forest Officer being Assistant to, and technical adviser of the Collector.

It is true that lately the Board of Revenue have taken upon themselves the control of finances which formerly vested in the Conservator. The reason for that was patent and need not be referred to here. But the Conservator being adviser to the Board should, I think, with tact and rationality, even now, have as much control over those finances, as it was ever intended by the Code for him to have.

Finally, the concluding part of 'Futaie's' article seems to some extent to approve of the coalition arrangement existing in Madras ; for he wishes a Forest Official to be Joint Secretary to Government. The Collector has the District Forest Officer, the Board of Revenue has the Conservator, and why should not the Local Government have an Inspector-General, to advise ?

COUPE DE REGENERATION.

Deodar in Kulu.

The most important tree of the Himalaya, the Deodar, is not unfrequently found mixed with the two Pines, the two Firs and the three Oaks, the Moru, (*Q. dilatata*) the Ban, (*Q. incana*) and the Karshu, (*Q. semecarpifolia.*)

In Bashahr, the tree extends to the vicinity of the arid zone where it is often found associated with the edible pine (*Pinus Gerardiana*) which latter is the most characteristic tree of the dry climate.

Pure Deodar forests are not rare in Kulu. Such forests are found either on abandoned fields (often in the vicinity of Deotas' temples); on land where, I believe, shifting cultivation had previously been practised; or in steep and generally inaccessible localities where they have not been subjected to ill usage at the hand of man. All these classes of pure forests are generally regular.

That loose soil is always the best suited for Deodar is quite apparent from the fact that Deodar encroaches upon adjoining fields with such a marked rapidity, that in a single year acres will be covered with an almost continuous mat of seedlings ; the result being that if such fields are not taken care of for a few successive years, they will have ultimately to be given up by the holders.

As a matter of fact, Deodar seed would always germinate very readily where the soil is sufficiently loose and moist, but the young seedlings growing in the open, where they do not find sufficient shade, dry up again in the succeeding hot months. Those exposed to the south are less likely to survive than those growing on other aspects. It is mostly on account of the absence of such shelter that Deodar sowings in patches in the unshaded areas, have, except in a few rare cases, where a couple of succeeding seasons have been exceptionally favourable, almost always resulted in failure.

In such open and unsheltered localities I would recommend that the *Blue pine* should always be raised, before Deodar sowings or plantings are taken in land. The Blue Pine would cover such grounds very quickly, and would, of course, nurse and force up the Deodar when the latter is introduced there. The desired result may be thus very soon obtained.

In many a grassy land throughout the valley, wherever firing had been put a stop to, if the situation were in any way favorable and the seed trees were not far distant, the young growth of *Kail* subsequent to the occurrence of the latest fires reminds one of the *Rakhs* of the lower hills where the forest fires always result in a beautiful crop of young seedlings of *Dodonœa viscosa*. It may be advisable, therefore, to set fire to all such open lands before Kail seed is sown there. But patches to receive seed should always be kept prepared beforehand. Deodar seed is heavy, some 225 grains per ounce. It often falls close to the seed bearers. As most of the pure Deodar forests in Kulu lie amongst cultivation, whenever a

sufficient number of seed bearers fringe the outskirts of such forests, it requires no labor or time to find the adjacent fields full of seedlings.

Unless such parent trees are removed by some untrained hand, the seedlings would do well under them and very few of them are likely to fall victims to the heat and dryness of the following seasons. Thus, if left alone, Deodar would go on extending itself till it had occupied the whole of the cultivation.

The occurrence of pure forests standing on deserted lands may be attributed to the Deodar thus spreading from the sacred groves surrounding the Deotas' temples or from a group of trees in fields.

The Deotas in Kulu, whose presence in the low lying Deodar forests probably accounts for the existence of the latter, have been, from time immemorial, much dreaded by the people.

The plants coming up from the seed shed by the trees of the sacred groves, were sometimes held to be the property of the temples, and owing to fear of and respect for the Deotas, the cultivators made no attempts to destroy them.

All forests which thus sprang up, have been of late years in possession of the Forest Department.

In fact, the people in Kulu always looked upon the Deodar as a temple tree and without the previous permission of the Deotas it could not be obtained.

For every tree they thus removed, they had always to pay either in cash, in goats, or in grain. Since the management of the Kulu forests has been in the hands of Government, it has been ruled that Deodar may not be claimed even on payment.

It is also probable that the district was once more thickly populated than it now is. All the old fields now occupied by Deodar were once cultivated, but the successive invasions of the Goorkhas, the Mandi people and the Sikhs, resulted in their being deserted, the consequence being, that wherever seed bearers were at hand, the whole of the deserted fields were taken up by Deodar.

It is on this account that most of the present low-lying Deodar forests of Kulu are often of uniform size and age.

The present year (1893) has been exceptionally favorable to the natural growth of Deodar in Kulu. The winter of 1891 was an abnormally dry one, it was therefore followed by a good seed year.

There was hardly a single Deodar tree in the valley which did not bear cones in 1892. A large quantity of Deodar seed was shed in November-December, 1892, and thanks to the spring rains, every seed seems to have germinated.

Thus, the natural reproduction, so far, is very satisfactory, but the next season may be perhaps comparatively dry. Consequently, more than 95 per cent. of the present seedlings may fail to survive.

On the other hand, if the succeeding years prove to be favorable for these young plants to establish themselves firmly, we

shall have, without any labor, some of the bare grassy lands covered with Deodar plants of equal age.

A few regular and pure deodar forests, found in localities where probably the people used to burn down the jungle in patches to take off it a few crops occasionally, have had their origin, I believe, in this manner, But quite different is the history of pure Deodar forests found on steep slopes or at high elevations.

As a representative of this class of forests, may be mentioned the Rolla and Drad forests of Sahraj, where hundreds of Deodar trees grow pure on rocky ledges in a comparatively poor soil. All such forests were, in the beginning, I believe, either mixed or pure forests of Pine and Spruce. Deodar which somehow or other got introduced there, drove out all these species, thus forming pure forests of its own. A good example of this may now be seen in the mixed forests of Mahli Dhar and Bung in Sahraj, where Deodar has already begun to establish itself and is expelling all other species. In the course of the next few years, Deodar is sure to dominate and ultimately to suppress all its companions—the Chil (*P. longifolia*) the Kail (*P. excelsa*) and the Rai (*A. Smithiana*)—and the forest will become one of pure Deodar.

But the most dangerous companion of Deodar is the Silver fir. If all other circumstances are favorable, the Silver fir would naturally keep the Deodar back altogether. With the exception of this enemy, I would never recommend that any of the usual companions should be ringed or otherwise removed. I would always leave the trees to fight their own battle.

Young seedlings of Deodar are, of course, readily browsed by goats, but when once it starts fairly, it cannot be easily suppressed. About the sapling stage, however, the condition it loves best is a side shade through the influence of which the Deodar would clear itself rapidly of its lower branches and attain tall boles.

Pines, Oaks and Rhododendron when mixed with Deodar, are the greatest safeguards against fires, as they keep down the undergrowth of grass and of more worthless species and also greatly increase the production of the soil.

As a rule, and naturally so, the reproduction of Deodar in Kulu in the mixed forests of Deodar and Pines is usually plentiful, while that of the latter is invariably conspicuous by its absence, because no seedling of pine or even of spruce would ever stand shade.

Both Oaks and Pines and sometimesSpruce are therefore the most useful companions of the cedar, inasmuch as they always foster it when it is young and simply disappear when they are no longer required.

Once the Deodar forms a thicket and throws out its powerful leader, it would grow in any soil under even the most unfavorable circumstances.

In bad and poor soils the trees would not, however, attain their normal size, as is the case in Dungruthana Shila, Paneo, Bohara and a good many other forests and sometimes if they

do attain the usual dimensions, they would begin to decay at the centre at a comparatively very early age, as is the case in Dalogi forest, where although the trees are very tall and clean boled, they have already begun to rot at the centre and probably in a few years hence none of them will be found healthy and sound.

It may also be due, to some extent, to the evil consequences of the removal of dead leaves and consequently to the absence of nitrogenous substances that the trees in the Dalogi forest have thus begun to decay ; but if the soil were deep enough, they would not, I believe, have suffered so much through the absence of humus.

On the other hand, the Deodar, when it once sets out fairly in deep clayey or loamy soils, would always stand even the most serious injuries.

As an instance of this type of forests, may be mentioned the Kalandi Dhar forest of outer Sahraj, which, when the Mandi people conquered that part of Kulu and set fire to all hamlets on that side was, probably, composed of straight Deodar poles.

The moment the invaders left the country, the people began rebuilding their houses. For this purpose every available pole in the above forest was cut away. The stools left behind were not, however, without side branches. As soon as the leader was off, the remaining branches turned up to form a number of leaders, the result being that the present growth at first sight resembles a coppice.

Similarly, wherever in rich soils the leader of an old tree gets injured, the tree does not die out, but the nearest side branch turns up to form what is termed a secondary or a false leader. Such trees are found in almost every old Deodar forest in Kulu.

As the care and proper supervision of Deodar will have the special attention of the Forest Department, no Deodar forest should ever be *clean cut*. I would recommend that all Deodar forests should be treated by selection felling, while we must be very careful to cut as few trees as possible on the steep slopes.

I doubt very much the advisability of Deodar sowing *in situ*. It is, I believe, more satisfactory to raise the plants in a nursery.

The principle, therefore, which we must never lose sight of is to have seedlings ready at hand to put out just after the felling operations are over and to give the forest perfect rest.

Sometimes, when a virgin forest is felled over, where the undergrowth is very scanty, and where the soil is full of humus, sowing broadcast or in patches may succeed.

The bad effects of the policy of falling back on artificial reproduction for filling up the areas denuded of Deodar by very heavy felling, after having given in vain, for years, sufficient light and air to allow a young growth to spring up, are quite apparent in the Nachar forest in Bashahr, in Dalogi and Jibi in Sahraj, in Bindraban and Phulga in Waziri Rupi, in Sandhar and Bain Padra in Upper Kulu and a good many other forests.

In all these areas heavily worked over, all conditions combined together have been very favorable to the luxuriant growth of *Desmodium*, *Indigofera*, *Berberis*, Brambles, *Viburnum* and numerous other weeds. Such worthless species are now found occupying every foot of the ground and if a Deodar seedling comes up anywhere, they would overshadow it and would thus retard its growth.

We cannot possibly get rid of such inferior species by cutting off or ringbarking. The best means to clear them away, in order to re-stock the areas with Deodar, would be, I believe, in raising a tree which would readily come up under such circumstances. Deodar should always be introduced later on. Regenerating all such ruined forests otherwise would be a matter of time and heavy expense.

At present, it is most difficult to find in any of the above forests, any traces of natural reproduction at all, while the artificial sowings and plantings, have not produced the desired result, except where such operations were taken in hand just in time, as was the case in some patches in Nachar in Bashahr, where Col. Bachelor had sown some Deodar seed broadcast, just when felling operations were going on and the worthless species had not yet time to spring up ; and in the upper portion of Latura Forest in Kulu.

The natural reproduction of Deodar in forests lightly worked out is generally good.

As an instance of this, may be mentioned the Blajdhar Forest of Sahraj. In is in such forests that the tree may be encouraged by artificial means.

Our aim must be always to re-stock and improve the forests, and therefore all badly growing and topsore trees should be removed at once.

Subsequent to fellings and the removal of suppressed trees, all blanks must be filled up as soon as possible and invariably before the inferior species have had time to come up.

As a rule, no forest should ever be worked unless we have got in nurseries at hand, a sufficient number of Deodar plants ready to be used at once wherever necessary.

Almost all the workable Deodar forests in Kulu have been of late years somewhat heavily felled over. The Kulu forests are still unclassed forests, the late lax rules of the Department have also much added to their present state of depletion.

The trees which escaped the Departmental axe were not rarely removed and utilized by the Zamindars, the consequence being that the present forests have been to such an extent exploited, that Kulu will hardly be able, for a good number of years to come, to supply for felling more than fifty Deodar trees a year.

The young Deodar forests of Kulu are, however, well stocked, while the plantations in the Upper Valley, where thousands of Deodar plants have been raised artificially, are, of course, of very great value and show the masterly hand of the Forest Officers.

In about forty years time the Kulu Division will yield annually the largest number of Deodar trees in the Punjab.

Nearly all these natural young Deodar forests have come up in spite of grazing. I am strongly of opinion, therefore, that moderate grazing by cows and bullocks does not do any damage to the young reproduction of Deodar. The cows would hardly touch the plant, even if there is nothing else for them to eat.

The present young Deodar forests standing on lands close to villages in Kulu, and of necessity grazed over by cattle almost every day during the whole time the plants were young and the grass had not yet died out, lead me to the belief that cow grazing does not much interfere with the young growth of Deodar. As a matter of fact, I would not allow grazing of cows on slopes, but when the most ruined forests on almost flat and abandoned cultivations have to be re-stocked, where the needles if not triturated under the feet of cows form a thick covering of undecayed vegetable matter and the soil becomes matted with weeds and inferior species, almost the only means to encourage natural reproduction is, I believe, by allowing moderate grazing. My belief is greatly intensified by observation. I find that all such areas heavily felled over and subsequently kept fenced and closed have thus got full of needles, weeds and worthless species, and it is sometimes quite in vain to search for a single natural seedling.

Great care should always be taken in gathering seed. If raw and unhealthy seed is sown we can never expect success. The cotyledons of healthy seed are generally green and if they are not so, the seed must be considered in an unhealthy state. As a rule, the seed should always be collected from isolated trees. The seed of such trees is generally good and when sown hardly ever fails.

The age at which Deodar trees in Kuluatta in workable girth, varies with soil, aspect, altitude and other circumstances.

It is probable that the following figures give a fairly accurate average.

GIRTHS.

4′ 6′ to 5 ft. AGE.	6′ to 6′ 6′	to 7′ 6′	to 8′ 6′	to 9′ 6	to 10 6′	to 11′6	12′
50 years	88	100	115	132	152	180	195-200

From 30 to 35 years are probably sufficient for trees of 4½ feet in girth to attain a girth of 6 feet. This cannot, however, be said to be the case in general.

In some compact pure forests where the Deodar grows close together, the trees may grow to a considerable height but they would hardly ever attain large girths. As an instance of this type

of forests, may be mentioned the Dalogi Forest of Sahraj, where, although the trees are very tall and the whole crop not less than 300 years old, the average girth is hardly above 6½ feet.

MIAN MOTI SINGH.

Kulu, 8th April, 1893.

The Commutation of privileges in Bahraich.

The following notes on a scheme for commuting the wood privileges of villagers resident within 3 miles of the State Forests of the Motipur Range, Bahraich Division, Oudh Circle, may interest the readers of the "*Forester.*"

Area affected.

The Local Government, in its Notification No. 441, dated 7th May, 1879, granted villagers resident within 3 miles of the boundary of the State Forests, the privilege of taking poles of the inferior kinds of trees for their own *bonâ fide* domestic and farming purposes free of charge, and of grazing their cattle in the State forests at reduced rates, but reserved to itself the right of discontinuing these concessions whenever it pleased. These privileges can only be exercised in the "Open Forests," the area of which in the Motipur Range is about 68,556 acres out of a total area of 1,18,776 acres. The greater portion of the "Open Forests" (*viz*, over 60,000 acres) is situated on the low alluvial plains of the Rivers Ghogra and Kauriâla and consists chiefly of grass lands interspersed with khair and shisham trees. This area is used chiefly as a grazing ground and is not capable of supplying timber such as is required by the villagers, and consequently this demand has to be met from the remainder of the "Open Forests," with an area of about 8,000 acres. This tract comprises the three open compartments which form part of the main sal Forests, *viz* :—the Bahay Forest, the open compartment between Motipur and Kakraha, and the open compartments between Dharmanpur and Jallia gourhi ; the two latter compartments contain a considerable quantity of sal, and all three are protected from fire but open to grazing.

Present method of exploitation.

Under the present system, the privileged villagers are entitled to as much timber, &c., as they require for their domestic and farming purposes, and the only restriction imposed by Government rules as regards locality, manner of cutting, &c., is that the produce

must be taken from the open Forests. There is no attempt at any systematic plan of working, nor can the Forest officials enforce the simplest sylvicultural rules, or take any precaution against wanton and destructive methods of exploitation; for, so long as they obtain a permit, the concessionists have a perfectly free hand in the open Forests ; blanks are increased ; trees are ruthlessly cut away without regard to the state of the soil, reproduction, &c.; and the over-head cover is opened out to such a degree as to expose the soil to climatic influences, while all protection in the shape of grass and undergrowth is destroyed by cattle.

Injury done by the concessionists.

The damage thus done to the present crop is enormous, while the deterioration of the soil is so great that forests which have been thus maltreated for any length of time, are incapable of producing good growth in the future. A striking example of the irreparable damage done by allowing ignorant villagers to have unrestricted liberty of cutting trees in valuable Forests, is shown in the case of the Bhinga Reserve in the Bahraich Division. The soil of this once magnificent sal producing area has been impoverished to such an extent by over cutting and excessive grazing, that it is impossible for it to produce another crop of sal unless artificial means are resorted to ; and when the present stock of sal either dies from natural causes or is removed, this forest will be reduced to the status of a scrub jungle covered chiefly with thorn bushes, and be incapable of even supplying the demands of the privileged villagers.

Amount of timber and poles removed annually.

To give an idea of the drain on the forests open to concessionists, it may be mentioned that there are 110 "privileged villages" adjoining the Motipur Range, the residents of which extracted 92,676 poles and 15,791 other pieces of timber from the open forests of this Range during the year 1891-92, while (as has been explained above) the greater number of the 108,467 trees were removed from an area of about 8,000 acres. It might be thought that each supply of building materials would last at least 3 or 4 years, but this is far from being the case, as indents for the full amount of their requirements are received annually from the householders ; and when questioned on this point, they state that the wood which they now obtain, being immature and of inferior quality, decays every year. The forests are thus burdened annually with the full requirements of 110 villages. Under these adverse conditions of excessive felling and grazing, the denudation of these forests is merely a matter of time and it is with a view to check this destruction, to reduce the total exploitation by 4-5ths and if possible to re-establish the fertility of the soil, that the present proposals are suggested.

Proposed future working.

To better understand these proposals, it is necessary to describe briefly the future system of working in this Range, so far as it concerns this scheme. A Working Plan is being prepared for these forests in which work will be prescibed for the three Working Circles described below :—

I. *Nishangara Working Circle*, which will include all the closed Forests from the Orai Nulla and the Nepaulese pillar No. 79 on the North, to the Jallia-Salarpurwa line on the South.

II. *Murtiha Working Circle*, consisting of the closed Forests between the Jallia Salarpurwa and the Bulcha-Bhamania lines.

III. *Motipur Working Circle*, containing the closed Forests from the Bulcha-Bhamania line to the Ghagowa Nullah.

The period for which work is being prescribed in these Circles in the present Working Plan is 15 years, and during this period improvement fellings will be undertaken annually in certain fixed portions of each Circle. The out-turn from these fellings will, in the first instance, be sold to lessees, but there will be large quantities of poles and suppressed trees available for supplying the requirements of the privileged villagers, and it is proposed to utilize this surplus stock for commuting the concessions under consideration. The timber thus set aside for the use of the privileged villagers, would consist chiefly of the better kinds of wood and be more durable than the wood of the inferior species now taken by them, and each householder's supply should last at least from 5 to 10 years. The coupes in each Working Circle will be marked a year before the felling is undertaken, and separate hammers would be used for marking trees for lessees and for privileged villagers.

Proposed rules regulating the supply of timber to concessionists.

The following rules show the manner in which the concessions may be commuted without inflicting hardship on the tenantry, while the exploitations would be carried on systematically, and with due regard to the potential capability of the Forests.

I. Sal timber and poles will be supplied free to each householder once in 5 years from the coupes in which cuttings are prescribed in the Working Plan. In cases of arson, however, timber will be supplied again free of charge, although the full term of 5 years may not have expired since the last supply.

II. All the privileged villages adjoining the Forests of the Motipur Range will be divided into 3 groups (or "chucks") to correspond with the 3 Working Circles and each group of villages will draw its requirements from a particular Working Circle. It is proposed that this grouping of the villages should, in the first instance, be made by the landlords, who are best qualified to

ascertain the convenience of the tenantry, and then be submitted to the Divisional Officer who would satisfy himself that each Working Circle is capable of supplying the requirements of the group of villages attached to it. If the Divisional Officer is of opinion that the probable out-turn from any Working Circle will be insufficient to meet the demand on it, he will make such modifications in the grouping of the villages as the circumstances of each case necessitate, and communicate the alterations thus made to the landlords concerned.

III. When the village-groups have been finally settled, the Forest Officer will prepare a nominal list of all the householders, and a statement showing the quantity of building material, etc., required by each.

IV. One-fifth of the total requirements of each group of villages will be supplied annually from the Working Circle to which it is attached, the rotation in which individuals or villages are to be supplied being decided by the landlords.

V. On the 1st October of each year, the landlords will submit to the Forest Officer an indent for the quantity of sal timber required by the villagers of each group, such amount not to exceed one-fifth of the total as ascertained under Rule III.

VI. It will be seen that under these arrangements it will take 5 years to supply the full requirements of all the villages in each group; consequently, during the first four years, a certain proportion of timber required by the remaining villages must consist of miscellaneous species. So that for the first four years it will be necessary to send the Forest Officer 2 sets of indents, one for sal (as mentioned in Rule V) and the other for miscellaneous timber.

VII. By the 1st December of each year, the timber required by the indents mentioned in V and VI will be marked by the Forest Department, and the villagers will be at liberty to enter the forests and cut trees thus set apart for their use.

VIII. After the timber has been cut, it will be inspected by some specially authorized forest official who will enter in a register the amount of produce taken out by each villager and issue a pass for its removal.

IX. All the cutting and export must be completed by the 31st March of each year, after which date no one would be allowed to enter the Forests.

X. The privileged villagers would not be allowed to obtain timber or poles from any of the forests in which grazing or firing is permitted, and could only cut and remove timber from the closed forests in accordance with these rules.

XI. Thatching grass might be cut in closed forests between the 1st October, and 28th February, on permits which would be supplied free by Rangers and Foresters.

B. A. REBSCH.

A New Fodder for Cattle.

An article has recently been published in '*Le Temps*' by M. Grandeau, Professor of Agriculture at Nancy, on a new fodder for cattle. This fodder consists of the young branches of trees, more particularly of the Beech and Birch, previously submitted to a special treatment, which is described below.

As is well known, the constituents of a plant, whether it be an annual or a perennial, are generally speaking the same ; cellulose, nitrogenous matter, sugars, fats. The proportion of these substances varies largely from one plant or from one organ of a plant to another; the age of the plant or of its different parts is the chief condition which regulates these differences. In general, the younger an organ, the richer it is in digestible nutritive substances. The reserves of nutritive material formed in special parts of a plant at certain times of the year, are destined to support the life and development of a new plant or a new organ until it is itself able to derive its own nourishment from the soil and the atmosphere. In the autumn, there is a considerable accumulation of such materials in the young branchlets; from which supplies, the young shoots of the spring derive the food substances necessary for their growth. The inner wood of the tree, on the other hand, contains practically none of these nutritive substances: nitrogenous matter, sugar, fat or starch. It is composed almost exclusively of hardened cellulose, more or less incrusted with mineral matter, and practically without any nutritive value.

Frequent trials have long ago been made to substitute partially for hay and straw in the feeding of cattle, sawdust, either crude or previously treated with various chemical agents. These trials have shown that sawdust is harmless as a food and does not cause disorders in the animals fed on it, but at the same time, that it is absolutely inferior as a food to the poorest straw. The first point is important, in so much as the perfect innocuousness of introducing the elements of woody tissue into the digestive organs of horses and cattle is established. As regards the second point, chemical analysis shows that wood richest in nutritive matter is not, weight for weight, equivalent to more than a quarter or a third of the nutritive value of the poorest straw. In speaking of the instinctive dislike cattle have of this kind of fodder, M. Grandeau mentions the well-known criticism of this method of feeding by a Norwegian Agriculturalist, who said that a peasant who had been recommended this regime for his bullocks, has only been able to persuade them to eat the sawdust by providing them with green spectacles in order to make them think they were eating good chopped grass.

However inappropriate wood may be as a fodder, it is quite otherwise with small branches, gathered in autumn, chopped up

and submitted to a special process of fermentation such as that devised by M. Ramann. M. Grandeau gives a table showing as an example of the rule mentioned above, how the quantities of the different nutritive substances contained in the small branches (of a diameter not more than one centimetre) of the Beech vary according to the season. This table shows that such branchlets contain a very much larger percentage of albumen, fats and starch in the winter than they do at the time of the opening of the buds or during the growing period; and also that the general nutritive qualities of these are equivalant to those of hay of medium quality and greatly superior to those of the best straw.

To transform such branchlets into fodder M. Ramann has prescribed the following treatment. First, they are broken up mechanically by a crusher specially adapted for the purpose and which is not expensive, next they are submitted to a regular fermentation effected as follows. To the broken branches is added 1 per cent of malt, they are then watered with warm water and left to ferment. After a time, which may vary from one to three days, the temperature of the mass rises to 60 ° or 70 °C., it should be maintained at a temperature of between 50 ° and 60 ° by stirring the mass, adding from time to time more liquid. The action of the malt transforms the starch into sugar, the other changes brought about by the fermentation are somewhat complex, but the final result is the production of a substance which is eagerly eaten by horses and cattle and very well digested by them. Experiments conducted on a large scale with this fodder on horses, cattle and sheep, of which several instances are quoted by M. Grandeau, have given excellent results, conclusively proving the superiority of the new fodder over straw.

The economy realized by this new method of feeding is also considerable; the gathering of small branches is not costly and takes away nothing from the value of the produce felled in a forest. The cost of preparation is estimated by M. Jena at from 1 f. 50 to 1 f. 75 per 100 kilgrams.

Branchlets of fruit trees and small shurbs can, M Grandeau thinks, be used with equal advantage in feeding cattle, and interesting experiments might be made with these at times when other fodder is scarce. M. Grandeau concludes his article with the remark that the Forest Department will doubtless see no greater harm in allowing the gathering of small twigs and branches from its forests, than in the removal of dead leaves for the benefit of small cultivators, permitted, in cases of necessity, in the forest regions of France. *(From Révue des Eaux et Forêts).*

A. F. G.

II.—CORRESPONDENCE.

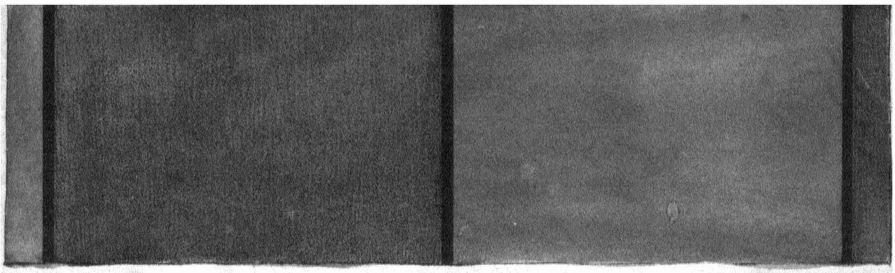
The Blazer Question.

We have this month received several communications on this subject and as, if we simply content ourselves with publishing them, the matter may go on till blazers are out of fashion and the writers of the letters are too old to play tennis and sport colours, we consider it best to review the matter briefly ourselves and endeavour to make some sort of a practical suggestion towards settling the momentous question.

The sheet, shewing more or less truthfully, three patterns or designs, which we publish this month, was done from specimens of cloth sent to us. No. 1, an arrangement of greens with a pattern of tree stems shewing a style of pruning which we cannot quite professionally approve, is a Bombay design, started, we believe, by our old correspondent 'Velleda' who actually took the trouble to circulate it to all the Forest Officers of his Presidency, with some rather interesting results in the way of remarks. We will let 'Velleda's own letter tell the story. We may say that we are not personally remarkably enthusiastic about blazers, considering that the fashion is going a little too far when every 'Arry' on the Margate sands sports a coat of many colours which may possibly be those of some club or other, but which, more usually, we suspect, represents only its owner's idea of what is really 'chic.' And besides, we believe that there are many Forest Officers who object to departmental colours altogether. 'Velleda' says :—

SIR,

I am sending you the pattern and papers at last. You will see that the pattern is approved by 7 votes, disapproved by 6, 5 men do not want any blazer, one or two rely on Coopers Hill, 5 suggest plain green, with or without badges of sorts, and 5 have not voted or have confined themselves to facetious remarks which may perhaps be interpreted to mean, that they will not wear one in any case. This is exactly the degree of unanimity that might have been foreseen. To the gentlemen who objected to "uniform," I would say that the question is not one of that nature at all, but



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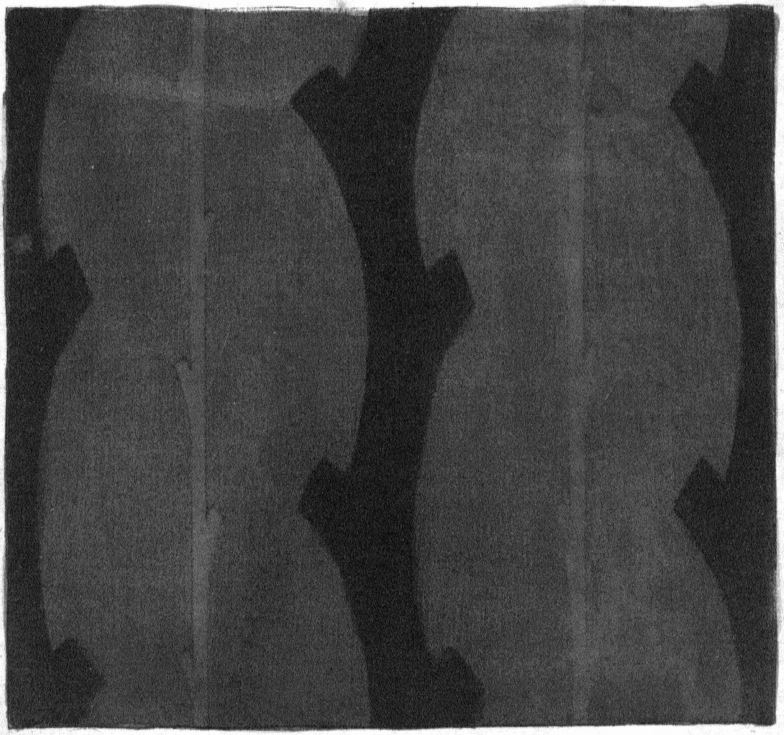

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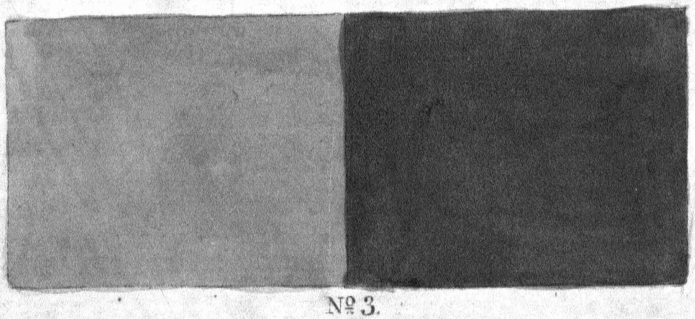

№ 3.

simply one of *esprit de corps*. Since the transfer to Coopers Hill, I am sorry to think that our *esprit de corps* has weakened. Indeed, two comrades who ought to know better, allude to the Coopers Hill blazer as synonymous with Forests. I would venture to remind these comrades that, however friendly their feelings towards Coopers Hill, they owe no kind of allegiance to the Public Works Department or Telegraph Department, and it is not even certain that Coopers Hill will always be the sole source of our Department. "Decadents" may think as little of *esprit de corps* as of a rag for which men have been (in their view) fools enough to lay down their lives, but these would-be cynics are in error. Merely as a commercial speculation, *esprit de corps* pays. It is the lever which moves the world. It is so important that our trades unions make it practically compulsory, and the law courts dare hardly say them nay. The Forest Department is emphatically not one that can afford to despise this weapon, and there can be no doubt that a blazer in common would be a distinct step in the direction of that unity which means strength. The institution of a blazer is, as some of our comrades have not failed to discern, a trifle; but they have possibly not considered that this trifle is not the end in view, but merely a step towards a greater end. After all, nearly every regiment and department in the country has its blazer, why should we alone loaf around, each man wearing a shred of Joseph's coat.

On the question whether the blazer should be reserved to the Imperial Service or extended to Extra Assistants, Rangers, &c., there is a majority of 10 to 4 in favor of the latter. Probably, some of the voters misunderstood the question in the sense of meaning Secretary of State's men *versus* other gazetted superior officers. I do not know that I should take much interest in a blazer that might be seen doing office in a Mamlatdar's Cutcherry, and I fancy the *esprit de corps* of native ideas is much too strong to be brought over to our side by any number of blazers. In fact, it would probably only tend to develop the modern principle that Jack is as good as his master, aye, and a—sight better.

As to the badge, a horn has been suggested. Why? Because it is used in Europe? The horn has never been in any way associated with Indian Forestry, and it has really about as much to do with it as a pair of crossed muskets. There is also the fatal objection that the horn is already appropriated to Rifle Regiments and Light Infantry. It is not a week since I saw a boating man (M. L. I?) with a green cap and white horn. If we want something unintelligible, let us have a monogram, of chinese letters for choice, or a small extract from the Koran. But for grace and intelligibility I still think a well-drawn *tree* is not to be beaten. A decrepit one might be preferred, with crossed axes at the root symbolical of the precarious existence of the department.

If you could publish a chromo of the proposed colors, whether mine, or plain green, and call for votes* from all India simultaneously, some result might be arrived at before each Mamlatdar is *ex officio* D. F. O. for his taluka, and the trained officer reduced to the position of a felling foreman.

My substitution of the "ragged staff" instead of the plain straight line, has not been so popular as I expected, and has even alienated votes received last year. This, I confess, astonishes me, for the R. A. have a much more remarkable zigzag, and few blazers are as quiet in general tone.

VELLEDA.

Patterns Nos. 2 and 3 have been received from Burma. No. 2 is from Messrs Harman & Co. and No. 3 from Messrs Macfie & Co. The latter is the pattern of the 'lungyi' worn by Foresters and Forest Guards in Burma. We are of opinion that No. 2 is 'too terrible' as a bright gaudy pattern; but that No. 3, a quiet neat pattern of two simple greens is not at all bad. The Department might well agree to adopt it if it has one at all, and especially we understand that the enterprising Rangoon tradesmen referred to, have laid in a large stock of the flannel. We reproduce, with apology to our respected Chief, Jungly Billy's letter.

SIR,

As this matter appears to hang fire, I venture to send you a sample of flannel (in two shades of green) which has been laid in in large quantities by an enterprising tradesman of Rangoon. The flannel is exactly the same shade and pattern as the Burmese forest subordinate's uniform and as a blazer looks very well. I would suggest that this material might be accepted at once, leaving the question of a suitable badge for a future date. If it is difficult to arrive at a decision, would it be ruled out of court to ask our esteemed I. G. to call a committee on the subject formed of all Conservators, with Mr. Pigot as Secretary? We know our I. G. is a very warm supporter of the blazer, for he offered, I believe, to clothe not only himself but all his servants with one as soon as the pattern was decided. He cannot do more to prove his strong support of the movement.

JUNGLY BILLY.

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*We shall be quite willing to receive from Forest Officer, post cards saying whether.

1 They desire a blazer at all.

2. If they desire one, what pattern they prefer, and to publish the information.

We presume it is known that the Dehra Dun Forest School and its Professors and students, past and present, have one already.

HON. ED.

III.—OFFICIAL PAPERS & INTELLIGENCE.

A Second Note on the Potato Disease in the Poona District and elsewhere.

The experiments of 1892-93 are described in detailed in Mr. Mollison's note, which is appended. The methods and results of cultivation are there fully described, and in this memorandum only the general inferences to be deduced need be dealt with.

Last year's note elicited a good deal of enquiry, and among other facts of interest it was ascertained that the "bangadi" or ring disease was much more widely spread than was at first known. It has established itself throughout the Bombay Presidency including Gujarát, and has been found in the Nilgiris, at Bangalore, and in Bengal. There can be no doubt that preventive measures should be adopted without delay wherever the disease has made its appearance, and fortunately the results of the present experiments are encouraging as regards the practical steps to be taken.

Among other communications received from correspondents some useful information was obtained from Mr. DeJoss, Superintendent at Panchgani, through the Collector o Sátára. Mr. DeJoss found that burning the soil with vegetable material, the land having been previously well turned up with the plough and exposed to the sun, was effective to destroy desease-germs, and he succeeded in producing a crop of several varieties which was remarkably free from disease. Three of these were, however, plainly grown from newly imported stocks, and they were planted on the ridge system and not in beds as by native cultivators. Major Radcliffe, Assistant Commissary-General at Mhow, wrote recommending the pulling of the haulms and also suggested that the "Magnum Bonum" variety might prove strong enough to resist the disease. We have, however, as shown in Mr. Mollison's note, found other varieties superior to the Magnum Bonum, and the idea of pulling the haulms was based on the assumption that the fungus, as in the European disease, fructifies on the foliage of the plant, which is not the case. But Major Radcliffe's recommendation gains interest from the latest conclusions reached by Dr. Cunningham, which also point to the pulling of the haulms as a preventive measure, though on somewhat different grounds. Mr. Creighton Duff of Coonoor is pursuing a series of experiments with potash and other manures intended to fortify the plant-system against infection.

Dr. Cunningham's researches were this season obstructed in some degree by an unexpected difficulty, viz., by the failure of the diseased seed supplied to him for cultivation to reproduce the disease in the crop grown at Calcutta. Probably, the diseased potatoes decomposed so far in transport as to lose their power of germination, and only the comparatively healthy ones survived. In any case, it must on no account be taken as proved that diseased sets produced a sound crop because they were grown on virgin soil. No conclusion has been more clearly pointed to by the experiments and observations conducted in the field during the past two years, than that the disease is propagated from the seed as well as from the soil, and that if anything the first source of infection is the more dangerous and common.

On the other hand, Dr. Cunningham is inclined to a contrary opinion, microscopical investigation leading him to believe that the lesions in the tuber are of a secondary nature. The primary lesions, he writes, are those in the haulms, and it is the disturbance of nutritive conditions determined by these which occasions the pathological changes in the tuber. He says, "I should certainly be inclined to believe that the disease is maintained not by the use of diseased tubers as such, but as the result of planting either diseased or healthy ones in soil contaminated by containing portions of the haulms with their mycelial and specially their sclerotioid contents." It may be added in this connection that the brownish tinge in the haulm which was noticed last year as a chief diagnostic symptom, has this year been much less marked. But although the discolouration has been less striking, following on an absence of the previously observed tendency tc the formation of sclerotioid masses within the larger vessels, it is always discoverable on section, Dr. Cunningham observing that in such preparations "the presence of abundant although generally isolated mycelial filaments comes out very clearly especially within the spiral vessels." In some young plants examined he found abundant mycelium in the cortical and pith tissues, whereas last year the fungal masses were noticed in the vascular system only. Pulling *and burning* the haulms might, apparently, tend to save the soil from infection, but it is doubtful whether this can be recommended in practice. The disease develops itself most a little below the soil surface, and extends downwards as well as upwards in the stem. When pulled, the stem breaks off at the main point of disease-developments, and as many germs would be left in the soil as would be removed.

The practical result of the Khed experiments of the past season is to show that certain varieties of imported seed can and do resist infection in a marked degree. The provisional inferences of last year were against this conclusion, but Mr. Mollison's experimental results have fully established it, and the cultivators of the district are eager to obtain seed from the new stocks at almost any price. Unfortunately, it is difficult to keep the cold weather seed

till the following winter, because of its tendency to sprout in the monsoon months, and it becomes necessary to grow a crop during the rains to provide seed for the main crop cultivation of the next cold weather. This rain-crop is not always as sound in cultivation as the dry-season produce, and here we find another cause tending to the deterioration of all stocks after they have been grown in this country for any length of time,

The "Bouillie Bordelaise" treatment of the land *before sowing* has succeeded in a very considerable degree, and there can be no doubt that flushing diseased land with the copper sulphate solution in the manner adopted in these experiments is specific as regards all disease germs which it reaches. It has been found in a large degree to protect sound plants from infection and to prevent the spread of disease from one plant to another. The treatment with caustic lime and soot has been inconclusive because the imported seed proved so robust that the failure of the disease to make headway cannot with certainty be attributed to the treatment adopted.

The same somewhat unexpected degree of success with the imported seed has prevented any very clear differentiation being arrived at with respect to the methods of cultivation followed. The ridge and furrow system, however, has not been proved to have the full advantage at first expected. This is probably due to the more rapid growth and maturing of the tubers in this country, the crop being ready in 14-15 weeks as against at least 20 weeks in Europe. The bed system with its superabundance of surface moisture, seems to enable the plant to effect the more rapid assimilation of food necessary under Indian conditions. But, on the other hand, it is extremely probable, as pointed out by Mr. Mollison, that the constitution of the plant is unfavourably affected by this luxuriance of growth and is more prone to disease in consequence.

The lesson so far learnt is that the disease may be largely checked by the use of the copper salt, but that reliance must chiefly be placed on the distribution of robust seed of the varieties which have been found most successful. It has also been found that the small cut sets used by natives induce weak growth, and that large cut sets or, better still, medium sized potatoes planted whole produce more vigorous seedlings. Great interest has been taken by native cultivators in the experiments, and they have shown themselves ready to take large quantities of seed at prices much over the market rates for the indigenous kind. There is therefore every prospect, at least in the Poona district, of our being now able to effect in the course of a few years a thorough change in the stocks cultivated, but it must be added that there is little prospect of inducing the rayats to give their land the needed rest from potato, without which all measures can only be palliative and no permanent cure can be expected

E. L. CAPPEL.

IV.—REVIEWS.

Annual Forest Administration Reports for 1891-92.

For the Punjab, Baluchistan, Ajmere and Berar.

The PUNJAB Report has not much in it of special note, the work of the year having been apparently uneventful, except that the Financial Results due to a quantity of timber having been withheld from sale in the previous year and disposed of in 1891-92, were especially good. The *gross* revenue of the Department was Rs. 10,20,074 and the *net* revenue Rs. 3,79,800, which is more than a lakh and a half above average.

The Government of India remark especially on the slow progress made in the preparation of Working Plans, but it would seem that a considerable amount of work was done in Bashahr.

The decision arrived at that old plantations like Changa Manga and Shahdera which have now passed out of the plantation stage into that of permanent forest, should be considered in future as forest, seems a correct one. It is doubtful whether our present system of distinguishing plantations from other areas is of much use : it certainly is difficult to keep up, especially as the views of different officers vary so much as to what is a plantation and what is only a work of improvement.

We note, with some surprise, that the coppice reproduction in Kalesar, the Sal forest on the North of the Jumna, was not bad even though it has been twice burnt ; and that the forest is being worked under strip fellings. We should have thought that, so far north, strip fellings would be rather dangerous, as frost is likely to be bad. This year, in the Dún, tall trees even have had their leaves blackened and their shoots destroyed by frost, and in open coppice areas the damage must surely be considerable.

There does not seem to have been, during the year, any attempt to increase the area of Reserved Forest in the plains districts, and the Punjab authorities appear to have faith in some mysterious benefit to be obtained by having 'protected' and 'unclassed' forests instead.

The BALUCHISTAN Report contains, as usual, several matters of interest and especially so is the order in the Resolution by the Foreign Department of the Government of India regarding the advisability of an increase of area. They say :—

"The area of State forests, which was augmented by 50 per 'cent during 1890-91, received an addition of only 5 per cent., or '4 square miles, during the year under review, the total reserved 'area at the close of the year being 82 square miles. The 'Governor-General in Council agrees with you in considering that 'greater progress might have been made. More energetic steps 'might have been taken to utilize in this direction the provisions 'of the recent forest enactments, and it was unnecessary to suspend 'or delay operations pending the assembly of the Forest Con-'ference. The Thalli and Zarghun tracts were declared State 'forests after the close of the year, and early steps should be taken 'for the reservation ef other forests in Ziarat and the Zhob District, 'or elsewhere as may appear desirable. The facts narrated in the 'Deputy Conservator's report are evidence of the rapidity with 'which unreserved forests are disappearing, and the Forest Con-'ference has recommended the extension of reserved areas. The 'Government of India accordingly desire that the whole question 'should be systematically considered with a view to the reservation 'and conservancy of all tracts which, after due investigation, it 'may be found expedient to maintain permanently for the supply 'of fuel or fodder"

And it is satisfactory that General Sir James Browne, R. E., the Agent, in his own Resolution, draws attention to the decision recently arrived at by the Forest Conference of maintaining the Department on its present footing and "extending the reservation 'of natural forests throughout Baluchistan including Zhob, all 'grazing rights being, where possible, excluded wherever forests are 'reserved." The General summarizes the objects of the Conference and its recommendations as follows: —

"The main points which it was required to consider and 'report upon were—

'(*a*) the coal and petroleum supply;

'(*b*) the cost of establishing, maintaining, and exploiting 'forest and other reserves;

'(*c*) the supply of water by artesian wells and otherwise, by 'which the cost of the production of wood-fuel might 'materially be affected; and

'(*d*) the possibility of a system of procuring wood from 'Sukkur by rail and stacking it in cantonments, or 'utilizing it for current purposes.

'The conclusions arrived at by the Conference were briefly—

'(*a*) that Government should be asked—

'(i) to continue the Siah Kach petroleum well;

'(ii) to put down an experimental boring simultaneous-'ly in the Chapper Rift;

'(iii) to sink an experimental well on a site to be 'selected and approved;

'(*b*) that the Government should maintain exisiting and 'future forest reserves in Baluchistan intact for use in 'times of emergency, that no Government Department 'within reach of the railway should purchase wood 'locally, but should be supplied from beyond the pro- 'vince, and that at least one lakh maunds of wood 'should be the military reserve of wood in Quetta :

'(*c*) that Government should grant Rs. 10,000 per annum for sinking artesian wells.

'It was also decided that Government should take over and 'work on a scientific basis all coal mines in Baluchistan."

The chief addition to the reserves seems to have been the Wam Kach forest, an olive bearing tract of 2,320 acres, practically an extension of the Wam Tangi forest. Other olive tracts are to be examined and taken up if possible. There are now 82 sq. miles of Reserves.

In regard to 'cattle trespass' a curious difficulty seems to have arisen from the practice of driving lame or diseased camels into the forests, for the pounds will not receive them and the owners refuse to claim them until they get well. This is something like the difficulties experienced in Nellore and other Madras Districts from half wild cattle which are claimed by no one and which are very difficult to deal with.

The following remarks on natural reproduction are worthy of extract.

"In some places in the Sibi forests the vegetation is closing 'up so well that it is impossible to go through it. In the higher 'portions where the soil is clay, there is no new growth between 'the existing trees.

'The "Jal" (*Salvadora oleoides*) is so improving with protection 'that the fruit (*Samrapilu*) is abundant enough to attract crowds 'of the poorer classes, who, on payment of a nominal fee, feed 'themselves and their families on it for the three or four weeks 'during which it lasts.

'In the juniper forests of Ziarat and Quetta, protection is 'showing marked effect on the undergrowth ; in Zarghun, especi- 'ally, the shrubs and grass are making great progress. It will be 'some years, however, before the soil is sufficiently enriched to 'support an advance growth of juniper, khanjak, and ash trees.

'There is generally a good supply of black soil under juniper 'trees, and with the improved growth of bushes, such as *Berberis*, '*Prunus*, *Lonicera*, etc., humus is forming under them also. 'Juniper seedlings seem to prefer stony ravines, where there is a 'little moisture. Seedlings of ash and khanjak are very rare, but 'of the bushes above mentioned fairly abundant.

'Measurements of thirteen trees made in September 1890, and 'September 1891, are here given. The juniper is a very difficult 'tree to measure well ; frequently it has several nearly equal stems,

'or the top of the best has died or been cut, and another thinner 'stem is taking its place. With regard to girth, the difficulty is 'still greater, owing to the immense thickness of the bark, which 'frequently comes off in huge flakes. It will be seen that some of 'the girth measures are actually less in 1891 than in 1890, a fact 'which is explained thus: To measure a tree, the rough outside 'bark has first to be cleared away and a smooth space made for the 'tape; during the year more flakes of bark peel off, and the 'measureable girth at the prepared place is less than in the previous 'year. The greatest growth in height is 10 inches, and in girth '¾ inch. The observations of a single year are, however, of 'importance only as the commencement of a series, which will 'become more interesting and valuable with every additional year's 'record."

Measurements of Juniper trees, Ziarat.

No.	Sept. 2, 1890.		Sept. 12, 1891.		Remarks.
	H.	G.	H.	G.	
1	14′ 9″	11½″	15′ 7′	11½″	These eleven are in the Ziarat Forest in a walled enclosure above the Mangi Ziarat road, except Nos. 8 and 9, which are just outside the walls; Nos. 3, 4 and 5 were not trimmed or cut in any way in 1890; the others were all more or less trimmed.
2	4′	4¼″	4′ 5″	4½″	
3	31′	2′ 5″	31′ 2½″	2′ 4½″	
4	25′ 6″	2′ 3¾″	25 11½″	2′ 3″	
5	3′ 3′	4″	3′ 5½″	3¾″	
6	8′	3″	8′ 4″	3	
7	9′ 10″	6½″	10′ 6″	7″	Damaged near road.
8	2′ 7″	2½″			Originally two nearly equal stems the smaller cut away.
9	5′ 5¼″	1¼″	5′ 10½″	2¼″	
10	6′ 6½″	3″	6′ 10″	3⅞″	Above water channel on Ghwoshki ridge on old camping ground No. 10 had a flower bed made round it in 1890, which perhaps accounts for its growth.
11	13′ 3″	10¾″	13′ 3″	10¼″	
12	6′ 7″	2½″	6′ 7″	2½″	
13	21′ 1″	1′ 7″	21′ 11″	1′ 7′	

The Baluchistan Juniper is *Juniperus macropoda*, and judging by specimens we have seen, its rate of growth is faster than that of the Himalayan kinds.

The revenue of the year was the highest to date, *viz.*, Rs. 20,609: while the expenditure was Rs. 30,497 and the deficit Rs. 9,888. We are glad to see that the authorities are not aiming at making the forests self supporting. We imagine that many years must elapse and much improvement take place before there is any chance of that and meantime the surplus revenue of other Provinces can easily afford to pay for the deficit in Baluchistan and for the constitution of a forest estate in a country of such difficulty.

The AJMERE Report is chiefly a record of the famine, and the fact that with the exception of 331 acres only, the whole area was thrown open to grazing. The extra Assistant Conservator reports as follows:—

"The year 1891 has been an exceptionally dry year, the total 'fall of rain being not even half the average of ordinary years.

'The village waste-lands soon failed to afford sufficient pasture 'for cattle, and there was no remedy to meet unexpected scarcity 'but to fall back upon the Government Forest Reserves. At first 'the cuttiug of grass (for plough bullocks) was allowed for one 'month and ten days, and 323,840 bundles of grass and dry leaves 'were removed. Grazing was then permitted, and with the excep-'tion of 331 acres (exclusively belonging to Government), all the 'reserves were thrown upon. As many as 47,989 cattle were 'admitted against 26,359 cattle in the preceding year. The strain 'on the forest was heaviest, the acreage per head of cattle for six 'months being only 1·85 as compared with 3·39 in the past year. 'But this was unavoidable.

'Owing to the failure of the rains the grass crop was scanty, 'and after what was removed by villagers there was little left for 'grazing. But it was principally the dry fallen leaves from trees 'which have supported the cattle. Cattle of villages unaffected by 'the Government Forest Reserves had to be driven to distant parts 'of Meywar and Malwa, where alone pasture was said to be avail-'able. Many of these cattle are said to have already perished.

'In the absence of forests, few cattle would have survived and 'agriculture would have received a rude shock. The importance 'of having snch reserves is now fully appreciated by all classes of 'people."

We agree with the Government of India in thinking that it is matter for satisfaction that the people were led to appreciate the advantages of reservation and we hope they will as equally understand the reasons for it if cattle are excluded in years when there is no scarcity. The Chief Commissioner apologizes for the wholesale throwing open of the forests and promises to bear in mind the recommendation of the Government of India regarding protection from cattle in future.

The reports on artificial planting shew clearly the much greater success obtained from transplants than from sowings: cuttings seem to have failed.

Unlike Baluchistan, Ajmere gives now a surplus revenue, the results for the year having been Revenue Rs. 19,799, expenditure Rs. 13,986, surplus Rs. 5,813. In our opinion, the whole of this ought to be spent on works of improvement.

As in that of Ajmere, so in the BERAR Report, the grazing question takes the chief place, in our opinion. We quote herein the remarks of the Government of India, which will we think, be read with interest in a good many other places.

"The observations on cattle grazing contained in the Report 'and in your review, have been read with interest. Adverting to 'the remarks of the Conservator on these subjects, the Government 'of India consider that the refusal to allow grazing privileges to 'persons other than agricultural residents of the villages adjoining

'the forests is warrantable, wherever scarcity of fodder exists or is 'apprehended. Cattle necessary for the *bonâ fide* requirements of 'the agricultural population, should usually be allowed the first 'claim to such grazing as may be available, but it is no part of the 'duty of the Forest Department to provide pasture for an unlimited 'number of animals, many of which can be of little or no service 'for agriculture and must die in seasons of scarcity. The cattle 'belonging to banjaras and other professional graziers, who rely 'entirely on the profits derived from milking and breeding, might 'reasonably, if admitted to graze at all, be charged a higher scale of 'fees than that demanded for agricultural cattle. It is understood 'that this subject will be especially treated in the Report for the 'current year."

The Conservator had specially reported that he had found the Amraoti Hills grazing area overrun by cattle belonging to breeders to the detriment of those who require grazing for their agricultural animals and we are glad to see that it is proposed to charge the cattle breeders higher rates. We have every sympathy with the importance of helping agriculturists to cheap and easily found grazing, but we have none for those persons who fill the forests with herds of miserable cattle, who take no precautions to select good breeding animals and who simply fatten on the lands which the Government provides for the benefit of the ryots.

The letter in which the Commissioner of the Assigned Districts, Col. Kenneth Mackenzie, C. I. E., reviews the Berar Report, is a very interesting one and shews that he has a great interest in Forest work and thoroughly appreciates the efforts of the Forest Staff, with all of whom he seems to be well and personally acquainted. We extract first of all, some remarks on the increasing demand for fuel for the Cotton Mills.

"What is causing denudation so rapidly is the demand on the 'part of Ginning Mills for fuel for their furnaces. These mills are 'starting up all over the country, even in so compartively remote 'a locality as Pusad. They consume annually an enormous quan- 'tity of wood. To raise the rates of fuel, as the Conservator 'suggests, would punish the proprietors of those mills insignificant- 'ly, without checking denudation, while it would furnish a serious 'grievance to the country at large. The rich already greatly feel 'the rise in fuel prices, and the poor are in such serious straits 'that for the most part they are driven for fuel to rely on cattle 'droppings. The remedy lies in driving these mills to use coal, 'either by cheapening the supply from Warora or circling them 'with nakahs, which should specially tax the wood they get in at 'such rates that they would be driven to the Central Provinces- 'Warora collieries, at present the only open source of coal supply 'in our neighbourhood." And we conclude with his remarks on the formation of dew, a question which some of our readers will, we hope, discuss in our pages.

"The explanation given of the curious meteorological fact 'noted during the year, *viz.*, an abnormally small dew deposit in 'the forests, mentioned in paragraph 130, attributes the cause to an 'alleged deficiency of moisture in certan winds that prevailed. 'This implies that the water given up by the winds is superimposed 'on the leaves as dew ; but I have understood that recent careful 'experiments in England have demonstrated that dew is only to be 'found on the *under* surface of leaves, and comes therefore not 'from the winds that blow above, but from the vapour given out 'by the earth below. If this is correct, then the absence of dew 'means not necessarily less moist land winds, but that the differ-'ence between the temperature of the air at night over the forest 'and that of the earth or the vapour given off by it was so slight 'as to fail to cause chill and a dew deposit."

The financial results of the year were—		Rs.
Revenue		5,11,180
Expenditure		1,97,340
Surplus ...		3,13,840

Notes on Forest Entomology.

We have received Nos. 1 and 2 of Vol. III of the useful 'Museum Notes' which are edited by Mr. E. C. Cotes. Although many of our readers will doubtless read these notes in original, we think it may be as well to extract a few of those which are most interesting from a forest point of view.

(1). In South India, Sandal is such a valuable tree that any disease in it requires to be most carefully investigated with a view to remedy. The following extract will be of interest to Forest Officers in Sandal Districts.

"A good deal of damage is said to have been done in 1891 to 'young sandal wood (*Santalum album*) trees in Mysore by a 'boring insect. According to a report, dated 13th July 1891, by 'the Assistant Conservator of Forests, Mysore, furnished through 'the Director of the Dehra Dun Forest School, this borer attacks 'both the stem and the roots, either killing the sapling outright or 'weakening it, so that it is liable to get blown over by the wind. 'Sandal wood yields an important revenue to the Mysore State, so 'that any damage done to the young trees is of consequence.

'The insect that seems to be chiefly responsible for the 'damage is the caterpillar of the moth *Zeuzera coffeæ*, Nietner, a 'species which occasionally attacks both coffee (*Coffea arabica*) 'and tea (*Camellia theifera*) bushes."

(2). The Dun is almost celebrated for its Mango gardens, but sometimes these gardens suffer from curious attacks now of insects, again of fungi, which are obviously detrimental to the

maintenance of the fruit supply. This was the case in 1891, many mango gardens having suffered from a small fly which damaged the young leaf shoots as described in the following extract.

"In April 1891 the Director of the Forest School, Dehra 'Dun, forwarded blighted shoots of mango (*Mangifera indica*), 'with the information that the whole of the mango trees in a large 'garden near Dehra were attacked, though, strangely enough, other 'trees close by had not suffered. The blighted shoots were aborted, 'so as to appear almost like a series of little green rosebuds upon 'the twigs. These false buds were found to contain mature '*Psyllidæ* (*i.e.*, minute fly-like Rhynchota allied to the Aphidæ). 'The insect has not previously been described from India, so it 'was sent to Mr. G. B. Buckton, in England, for determination. 'He has named it *Psylla cistellata*."

(3). Tamarind beetle: we extract. "From the Secretary to 'the Agri-Horticultural Society of India were received (6th July '1891) specimens in different stages of development of a Bruchid 'which attacks the seed of the Tamarind tree (*Tamarindus indica*) 'in Calcutta. The insect was submitted to Mons. A. Fauvel, who 'has kindly examined it and reports that it belongs to the species '*Caryoborus* (*Bruchus*) *gonagra*."

(4). During the tours of the Forest School students, many interesting notes are often made on the entomology of the forests, and more especially since the entomology prizes have become a feature of the School Examinations. The following extract refers to the small beetles which burrow between the bark and wood of the blue pine trees which had been barked or girdled in order to relieve suppressed deodar beneath them.

"In May 1891 the Conservator of the Forest School Circle 'forwarded, from his camp near Chakrata in the North-West 'Himalayas, a log of *Pinus excelsa* attacked by a bark-boring 'Scolytid. This insect was said to have attacked some trees that 'had been girdled, and were dying. The specimens were submitted 'to Mr. W. F. H. Blandford who very kindly examined them and 'determined them as belonging to a species of *Polygraphus* near 'to the European form *Polygraphus pubescens* Linn. For an ac-'count of *P. pubescens* which Mr. Blandford thinks likely to 'prove similar in habits to the *Pinus excelsa* insect, see Eichhoff. 'Eur. Borkenkäfer, page 122, (1881)."

(5). Similar investigations have been made in other Circles, witness the following.

"In July 1891 a number of insects were received through the 'Director of the Dehra Dun Forest School, from the Officiating 'Conservator of Forests, Central Circle, North-Western Provinces 'and Oudh, with information that they had proved destructive to 'Chir (*Pinus longifolia*, in the Baldhoti plantations.

'The specimens were found to comprise four species of 'Acrididæ (*viz.*, *Chrotogonus sp.*, *Catantops indicus*, *Caloptenus sp.*, 'and *Œdulus sp.*, all said to nip off the young plants, also

'numerous obscure Curculionidæ beetles and earwigs (Euplexop-
'tera) said to be found in dying trees, and probably therefore of
'but little importance. The Acridid responsible for most of the
'nipping off of the young *chir* trees is probably the *Chrotogonus*,
'of which numerous specimens were furnished. This insect is a
'very common one in many parts of India, and has repeatedly
'been sent to the Indian Museum as destructive to crops, but no
'satisfactory method seems to have yet been discovered for dealing
'with it. The bran and arsenic insecticide, which is said to have
'been successfully used in the United States against some kinds of
'Acrididæ, might perhaps be worth trying. It is made by mixing
'together one part of arsenic, one part of sugar, and six parts of
'bran, with a little water to form a paste. It should be sprinkled
'over the plantation for the Acrididæ to eat; the greatest care, how-
'ever, is necessary in using it on account of the poisonous nature
'of the arsenic."

(6). The large beetles of the family of the erambycidæ are among the most destructive of the borers which attack the Sal (*Shorea robusta*). The following extract refers to similar attacks on an Assam species of Shorea and will be found of interest.

"In August 1891 a block of *Makai* wood (*Shorea assamica*)
'was received through the Dehra Dun Forest School, from the De-
'puty Conservator of Forests, Lakhimpur Division, Assam. It was
'found to be tunnelled in all directions by Cerambycidæ larvæ. A
'full grown beetle emerged shortly after the block was received
'and proved to be closely allied to a specimen in the Museum
'collection determined by Dr. Lameere as *Neoceramb yx holosericeus*
'(=*Holesthes holosericeus*, *Gahan*). It differs, however, from this
'species, in possessing a series of spines on the antennæ. A
'specimen of the Cucujid *Hectarthrun brevifossum* Newm. also
'emerged in the rearing cage from the same block, and may,
'perhaps, prove to be parasitic on the Cerambycid.

(7). Black unwholesome looking sticky messes are often seen on forest and fruit trees, and most often on the orange and lime. The following extract refers to an unpleasant attack of the sort which affected the thorny bamboos at Dehra.

"In March 1892 specimens were forwarded by the Director
'of the Forest School, Dehra, of an Aphid which was found attack-
'ing the leaves of *Bambusa arundinacea* in the school compound.
'The insect covered the leaves with a black sticky gum which was
'in such quantities that it fell off in drops. The insect is unnamed
'in the Museum collection, and specimens have therefore been
'forwarded to Europe for comparative examination." It has since
'been named '*Oregma bambusæ*' by Mr. Buckton.

(8). "Insects said to infest the *Terminalia belerica* tree in
'the Thana district, Bombay, were forwarded to the Museum in
'February 1891 by Mr. F. Gleadow of the Forest Department.
'The insects were found to be of two kinds—(1) a Bostrychid
'borer, identical with specimens reported on by Dr. Gunther of the

'British Museum as *Sinoxylon sp.*, and (2) a small Cucujid which 'has been submitted to Mons. Fairmiare, who has kindly examin-'ed it and reports that it belongs to the species *Lœmotmetus* '*insignis*, Grouville. The Cucujid is not likely to do much damage, 'but the Bostrychid is very probably destructive."

(9). The beetle, the subject of the next extract, was discovered by the noise he made in carrying on his excavations in the specimens in the Forest School Museum. He might have had a grand feast and tasted the qualities of many kinds of woods had he not made such a noise over his work.

"Specimens of the Cerambycid beetle, *Stromatium barbatum*, 'Fabr., were forwarded to the Museum in June 1891 by the 'Director of the Forest School, Dehra, with the information that 'they had been damaging wood specimens in the School Museum. 'A block of khair wood (*Acacia Catechu*) that was forwarded with 'the beetles was found to have the whole of the sap wood riddled 'with tunnels made by the larvæ. These tunnels were tightly 'packed with the powdered wood that had been eaten out and pro-'bably passed through the digestive organs of the grub. The 'hard heart wood was untouched."

(10). "In March 1891, specimens of an insect, said to injure 'gall-nut trees (*? Terminalia Chebula*) on the Kambakkan 'hills, were sent to the Indian Museum, through the Dehra Forest 'School, by the District Forest Officer, Chingleput, Madras. The 'specimens proved to be little cone-shaped larval cases of a Psychid 'moth. They were a little larger in size but otherwise indistin-'guishable from the larval cases of the species *Babula grotei*, Moore, 'a species which often defoliates ornamental shrubs in Calcutta 'gardens."

(11). Finally, we will conclude with the following remarkable note on the red mites which may, we hope, elicit information to confirm Mr. Clifford's observations on the subject.

"A note written some years ago by Mr. M. H. Clifford, late 'of the Forest Department, has recently been found amongst some 'old papers in Dehra. According to this note, native hakims ex-'tract a kind of oil from the large velvety red mites (*Tetranychus* '*sp.*), commonly known as *red spiders or Birbhoti* in the North-'West Provinces. The oil is sold for medicinal purposes at a high 'price, and even the insects themselves fetch as much as a rupee 'per tola. It will be interesting to learn if anything further is 'known of the medicinal virtues attributed to this mite."

There can be no doubt that the information afforded by these very simple observations will be of great value to the Department, and we think that every advantage should be taken of Mr. Cotes' being at the Calcutta Museum to get forest insect phenomena investigated and information recorded as to the identity of the animals and the best means of encouraging them or repressing them, as the case may be.

(To be continued).

V.—SHIKAR.

"A trip to Bara Bangahal."

(Concluded.)

6th June.—Started early before sunrise to visit the gorges and cliffs west of the valley I went over yesterday.—The scenery is very wild and impressive. The cliffs and peaks are so pointed and steep, they look as if they would come tumbling down any moment. We spotted 3 Ibex high up one of the gorges, but the ground was too dangerous to permit of our stalking them. After breakfast, returned down the valley with the camp to Dalli Gote, where I had bagged the monster bear on the 4th June. Our road lay along the Ravi, which was covered over with snow 15 to 20 feet deep in places ; the walking was easy, though dangerous, as even such thickness of snow will occasionally crack up and let one down into a rushing torrent below. Saw nothing else all day but an adder which we destroyed.

7th June.—Started at dawn for the Larum nala a perfect paradise for brown bear. The nala or both sides is covered with beautiful Blue Pine forests and occasional strips of Deodar with open glades where bears feed. We passed a shepherd *en route* who was bemoaning the loss of three of his sheep killed during the night by a leopard, I wished I had had time to stop another day to look up Mr. "Spots," but I was anxious to finish the inspection of this last nala, and get back to head quarters. Soon after getting well up the nala, we spotted a young brown bear which was undoubtedly the one I had had 9 shots at on the 5th June, for he was very uneasy, and would not stop to feed. While tracking him, I spotted a splendid old brown bear across the valley—so left the cub to settle down, while we hurried on to get up to the big one. After some difficult walking and scrambling over fallen trees and soft snow, we came right on to him, feeding in an open glade and bagged him after hitting him twice. It being now too late to skin him, we rolled him under a rock, covered him over with stones and leaves, and tied my handkerchief as a flag over his carcase to frighten away hungry foxes, and then hurried back to camp, which we did not reach till dark. Killed two more adders to-day.

8th June.—Was too fatigued last night to sleep well, so did not start on my rambles till late in the day. Just as I was sitting down to enjoy breakfast in the forest, I spotted a she bear, and two large cubs across the ravine. Leaving the breakfast to take care of itself, the Shikary and I started off sharp to get above them, I soon got within shooting distance, and bagged the she bear and one of the cubs, the other escaped before I could reload. A single barrel rifle is decidedly a mistake. Later in the evening I came across the cub again and bagged him and soon after, on our way back to camp got within easy shot of another very handsome bear which I was fortunate to bag too, making in all 4 bears to-day. The dark colored bears with silver tipped fur are far handsomer than the ordinary light redish colored ones.

9th June.—Was enjoying a Sunday morning in bed when I was awakened by the excited shikary who ran in to say he had spotted a bear opposite our camp—and that he was quite close. I certainly felt very disinclined to get up, for I had had enough bear shooting; however, it was time to get up, so I dressed leisurely and walked out to see it, which was across the stream running past our tents. The sweeper just then let go the dogs, who catching sight of Mr. Bruin hurried on to make his acquaintance and we much enjoyed watching the chase which was more exciting than shooting bears. Returned to Bara Bangahal village in the afternoon.

10th June.—Started early and pitched camp in the Dhanna Gote, first stage to the Thanesar Pass. Shot several snow pigeons *en route* ; a dreary evening, raining hard ; completed a map of the Bara Bangahal Valley, and was amusing myself cleaning up my guns and rifle to put away, as there was no hope of any more shikar once we had crossed the Pass, when there was suddenly a shout of "bear" from two or three of the coolies in camp. Running out with my rifle and getting over the broken ice covering the stream below us, I got a shot at what turned out to be a sheep-eating bear ; he was a splendid specimen, but had a very mangy head, I had 5 shots at him before I could kill him.

11th June.—Up at dawn and after an awful climb of 5 hours through snow, and over rocks, we reached the top of the Thawsar Pass 16,729 ft. above sea level, at 11 o'clock. The view was most magnificient, nothing but snow all round us as far as the eye could see. The glare of the sun on the snow was awful, and I was glad to start on the downward journey after finishing my breakfast ; the whole day's journey, which lasted till 5 p. m., was through snow ; tobogging was freely indulged in by coolies and all and was certainly the easiest way of getting over the ground. Three of the unfortunate coolies suffered from the cold and the glare, and were almost blinded. Pitched camp at Jhoodi. This must be the end of "The trip to Bara Bangahal" for we had no more sport after leaving Jhoodi.

F. O. L.

VI.—EXTRACTS, NOTES AND QUERIES.

Sir Edwin Arnold, the Monkeys and the Cocoanuts.

Can cocoanuts be plucked from trees as one would pluck cherries or hazel nuts? Sir Edwin Arnold appears to think they can: in fact he says he has seen monkeys plucking them. His description of this interesting and unique occurrence may be found in one of those delightful articles which are now appearing from his pen in the *Daily Telegraph*, and of which the following is an extract. In writing about books of travel and how much they interested and impressed him when he was a boy; he says:—"Day after day I 'revelled in that rich feast of ocean adventure, and day after day 'wished more and more for myself also to sail the sea and to cast 'eyes upon those fair and various lands, those strange peoples, 'those lovely islands set like jewels in the silver of the main, and 'shining under such glad and warm skies. Especially do I 'remember one prodigious volume which described some old 'worthy's travels in India and which contained a plate that charged 'my imagination brim-full of wonder and interest. It represented 'a scene upon the Malabar coast, with the sea gently breaking 'along a sandy bay, the curve of which was fringed with cocoanut 'tropical vegetation. Monkeys were climbing the stems of the 'palms or perched in their frondage; and curiously shaped and 'coloured birds hovered over the edge of the waters or waded in the 'lagoons. It saturated me, that ancient picture, with the passion 'and the purpose to see India, some day and to study the trees and 'flowers and birds and beasts and inhabitants of such a surprising 'country. All which has since duly befallen, for books are mighty 'in guiding and controlling us. I recall one hot, silent memorable 'day in the Concan in India, when we came down from the hills 'where we had been shooting, to take passage in a pattimar for 'Bombay. We sat under the shade of the cocoa-palms by the edge 'of the rippling Indian Ocean. Where had I seen the beautiful, 'wild, quiet scene before? When had I before visited that sleeping 'sunny bay of the Malabar shore with its long curving lines of 'cocoanut trees fringing the blue water, its milky wavelets break-'ing upon the golden sand, washing the shells and star fish and 'clumps of bronze sea weed and red rocks? What made the spot 'upon which I was certainly now for the first time planting my 'delighted feet, so impossibly familiar, so unreasonably known? 'I seemed to recognise every feature in the landscape and the sea-'scape, the very boats fishing were such as I had viewed in the 'very same places, and the cut of the mat-sails on the trading bunks 'and the dress of the sailors and fishermen bore no new appearance. 'Puzzled and meditative, I was wondering if the Hindoo doctrine 'of former existences was indeed true, when my Mahratta shikari

'called out, "Bandur lôk! dekho sahib," "Look at the monkeys."
'Behind us, in a near clump of cocoa-palms, some of the four-handed
, folk were demurely ascending a tree full of nuts, and two of them
'were already ensconced in the crown *plucking of the green fruit.*
'In a moment I remembered. It was the veritable scene depicted in
'that old book of travels! By accident—if anything in human life
'can be so called—my boy's dream and desire had come precisely
'true. There was the place before my eyes over which I had hung
'entranced in the nursery, it was the actual spot realised; if King
'George's artisis had limned it by my side, he could not have hit off
'that lovely nook of Malabar with happier precision.'

G. E. M.

Corean Paper-Making.

A report of the United States Consul-General in Corea, treats of the manufacture of paper. This is one of the leading industries, for paper is highly esteemed, and always forms part of Royal presents, and of the tribute paid to China. Besides its use for writing and books, it is employed in a great diversity of ways. It serves as string, and in the manufacture of lanterns, fans, umbrellas, shoe soles, hats, boxes, and coats. It is also used for covering floors, walls, and ceilings, and, stretched on frames, supplies windows and doors. Corean paper is highly prized in China and Japan, and is especially sought for the manufacture of umbrellas. It is made, from a bush of the mulberry order (*Broussonetia papyrifera*), which is indigenous, growing in many parts of the kingdom, but thriving best in the moist, warm climate of the south. It is chiefly grown from cuttings for this especial purpose, and the wild and cultivated plants are said to be of equal value. The bark, which alone is used, is generally gathered in the spring, and it is boiled for a long time in water, in which a quantity of wood ashes has been mixed, until it becomes a pulp, the mass having been beaten during the whole time of the boiling. Fine bamboo screens are then placed in shallow wooden vats, and a ladleful of the pulp is evenly spread over the screen by a dexterous circular motion of the hand. This operation is repeated once or twice, or as often as may be necessary—the more frequent the operation the finer the paper—and the screen is allowed to drain into the vats until a proper consistency is reached, the drippings being thus saved They are placed on a hot floor to dry. After the drying has proceeded far enough, the paper is again laid on a hot floor and ironed by hand. The long lines in the paper show strands of the bamboo screens, and their nearness, distinctness or absence indicate the fineness or otherwise of the paper. They are almost imperceptible in some grades of paper, while in others they are distinct and far apart. Paper is made by the Paper Guild, a numerous and prosperous association. The province of Chulla is the chief seat of manufacture. (*Times*).

VII-TIMBER AND PRODUCE TRADE

Churchill and Sim's Circular

APRIL, 6th 1893.

EAST INDIA TEAK.—There has been some improvement in the demand during the month, the Dock deliveries showing 1,370 loads in March, 1892, and 1,723 loads in March, 1891. The deliveries for the first quarter of the three years have been respectively 2,771 loads, 2,963 loads and 4,582 loads. Prices, however, have dragged again somewhat, and the stock has increased. The gloomy outlook for the ship-building industries throws its shadow with depressing force over the Teak market, in spite of the ever growing popularity of the wood for more general purposes.

ROSEWOOD, EAST INDIA.—Small sales have been made without any further decline in prices, but the demand is not at all active.

SATINWOOD, EAST INDIA.—*Logs*, if large and well figured, would command fair prices and unsold sorts is limited to the parcel just arrived ; *planks* and *boards* there is no enquiry.

EBONY, EAST INDIA.—Sales are only occasionally possible.

PRICE CURRENT.

Indian Teak	per load	£9	to	£15
Satinwood East India	per ton	£5	to	£10
Rosewood „	„	£5	to	£9
Ebony „	„	£5	to	£7

MARKET RATES OF PRODUCTS.

(*Tropical Agriculturist, May 1893.*)

Cardamoms, Malabar	per lb.	2s.	to	2s.6d.
Croton seeds	per cwt.	15s.	to	20s.
Cutch	„	20s.	to	32s.
Gum Arabic	„	50s.	to	90s.
Gum Kino	„	£16	to	£17.
India Rubber, Assam	per lb.	1s.7d.	to	2s.3d.
„ Rangoon	„	1s.7d.	to	1s.11d.
Myrabolams, Bombay	per cwt	10s.	to	11s.3d.
„ Godavari	„	7s.9d.	to	8s.3d.
Nux Vomica	„	8s.	to	9s.6d.
Orchella	„	22s.	to	28s.
Redwood	per ton	£3.	to	3-10s.
Sandalwood, logs	„	£35	to	£65
„ chips	„	£9	to	£30
Sapan wood	„	£4.	to	£7.
Seed lac	per cwt	40s.	to	90s.

VIII.—EXTRACTS FROM OFFICIAL GAZETTES.

1.—Gazette of India.

7th April, 1893. No. 392-F.—The following changes are made consequent on the return from furlough of Mr. H. C. Hill, Conservator of Forests, 1st Grade, with effect from 18th March 1893:

Mr. Hill to be Conservator of the Central Forest Circle, North-Western Provinces and Oudh.

Mr. C. Bagshawe, Conservator, 2nd (officiating 1st) Grade, Central Forest Circle, North-Western Provinces and Oudh, to revert to his substantive grade.

Mr. P. J. Carter, Conservator, 3rd (officiating 2nd) Grade, Pegu Forest Circle, Lower Burma, to revert to his substantive grade.

7th April 1893. No 396-F.—With reference to the Notification of this Depatment, No. 339-F., dated the 17th ultimo, Mr. C. Bagshawe, Conservator of Forests, 2nd Grade, is appointed to be Conservator of the Berar Forest Circle, with effect from the date on which he may relieve Mr. F. B. Dickinson of the charge of that Circle.

19th April, 1893. No. 432 F—With reference to the Notification of this Department, No. 396-F., dated the 7th instant, Mr. Bagshawe assumed charge of the Berar Forest Circle on 31st March 1893, on which date Mr. Dickinson, Officiating Conservator, availed himself of the furlough granted him in Notification No 339-F., dated the 17th ultimo.

21st April 1893. No. 439-F. —Mr. Dansey, Conservator of Forests, 2nd Grade, Bengal, availed himself on 14th April 1893 of the privilege leave granted him in the Notification of this Department, No. 206-F., dated the 17th February last; and Mr. Chester's appointment as Officiating Conservator, 3rd Grade, Bengal, took effect from that date.

Mr. P. J. Carter, Conservator, 3rd Grade, Pegu Circle, Lower Burma, is appointed to officiate in the 2nd Grade of Conservators from the same date.

2—Madras Gazette.

28th March, 1893. No. 147.—

No.	Name and designation of officer.	Present grade.	Grade to which promoted.	Nature of promotion.	Remarks showing cause of vacancy,
1	Mr. E. R. Murray ...	Deputy Conservator of Forests, Fourth Grade.	Deputy Conservator of Forests, Third Grade.	Acting ..	With effect from 1st April 1893 (during the absence of Mr. Porter on furlough, or until further order).
2	Mr. P. M. Lushington ...	Do. ...	Do. ...	Do. ...	With effect from 1st April 1892 (during the deputation of Mr. A. W. Lushington to act in the second grade, or until further orders).

24*th March* 1893 —To Ranger Balaji Singh for two month from date of relief, under article 291 of the Civil Service Regulation.

15*th April* 1893 *Posting and Results of* 1891 *Dehra Dun Students* —The following are the results for the Government students from the Southern Circle, who went up to the Dehra Dun School in 1891:—

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„ E J. D Pierce,	do.	do.	
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K Gajaraja Mudaliar, Forester, on Rs. 30 do with Medal in Botany.
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Forester T. Arumuga Mudaliar
Do S Ramaswami Aiyar, with Medal in Forest Mathematics.
Ranger Venkata Kistnama Nayudu.
Forester C Rajagopal Nayudu.
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23*rd April*, 1893.—Mr. G R Middleton, South Arcot District, from the 4th Grade to 5th Grade Ranger from the 23rd April 1893.

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18*th April*, 1893 —S. Solomon, Acting sub. *pro tem* Ranger on Rs. 50, North Coimbatore, is confirmed as Ranger on Rs. 50, from 1st April 1893.

3.—Bombay Gazette.

1*st April*, 1893. No. 2356.—His Excellency the Governor in Council is pleased to appoint Mr. W. R. Woodrow, Deputy Conservator of Forests, Third Grade, and Divisional Forest Officer, Dhárwár, to take charge of the office of the Divisional Forest Officer, Bijápur, in addition to his own duties, pending further orders.

10*th April*, 1893.—Mr. W. R. Woodrow, Deputy Conservator of Forests, received charge of the Divisional Forest Office, Bijapur,, from the Collector, Mr. J. Monteath, on the 5th April 1893, after office hours.

4.—Bengal Gazette.

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3*rd April*, 1893. No. 1567.—The Notification, No. 3584 For., dated the 17th October, 1892, published at page 940, Part I of the *Calcutta Gazette* of the 19th idem, delaring that a record of rights should be prepared in respect of all forests in the Palamau district constituted reserves under section 34 of the Indian Forest Act VII of 1878, is hereby cancelled.

8*th April*. 1893. No. 1760.—Mr. C. C. Hatt, Assistant Conservator of Forests, attached to the Darjeeling Forest Division, is granted one month's Examination leave, under section 69 of the Forest Department Code, with effect from the 1st April, 1893, or any subsequent date on which he availed or may avail himself of the leave.

5.—N. W. P. Oudh Gazette.

5*th April*, 1893. No. $\frac{946}{11-32A}$.—Lala Har Swarup, Extra Assistant Conservator, (Superintendent, Timber Depôt) from Bahramghát to the Gorakhpur Forest Division.

6—Punjab Gazette.

12*th April*, 1893. No. 264.—Mr. G. S. Hart, Officiating Deputy Conservator of Forests, and Lala Jowála Parshád, Extra Assistant Conservator of Forests, respectively made over and received charge of the Umballa Forest Division on the afternoon of the 1st instant consequent on the separation of the Simla Hill Tracts from that Division.

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7.—CENTRAL PROVINCES GAZETTE.

30*th March*, 1893. No. 1519.—*Erratum.* In this Notification No. 4373 dated the 14th November 1892, *for* "6th instant" *Substitute* "6th October 1892," as the date from which Mr. P. H Clutterbuck, Assistant Conservator of Forests, was granted three months' privilege leave

13*th April*, 1893. No. 1770.—Leave, under Article 343 of the Civil Service Regulations, is granted to Mr. Menzies, Assistant Conservator of Forests, with effect from the 6th January 1893, on which date he availed himself of it.

8.—BURMA GAZETTE.

25*th March* 1893. No. 4.—With reference to Revenue Deptartment Notification No. 60 (Forests), dated the 22nd February 1893, Mr. H. G. Sharpe, I. C. S., Assistant Commissioner, reported his arrival at Mônywa for Forest Settlement duty on the forenoon of the 21st March 1893.

29*th March* 1893. No. 114.—Mr. W. F. L. Tottenham, Assistant Conservator of Forests, is transferred from Pegu to the charge of the Agency and Depôt division of the Pegu circle.

29*th March*, 1893. No. 115.—Under the provisions of Articles 277 and 291 of the Civil Service Regulations, privilege leave for three months is granted to Mr. J. Allmark, Extra Assistant Conservator of Forests, with effect from the 1st April 1893, or the subsequent date on which he may avail himself of it.

7*th April*, 1893. No 5.—With reference to Revenue Department Notifications Nos. 114 and 115 (Forest), dated the 26th March 1893, Mr J. Allmark, Extra Assistant Conservator of Forests, made over, and Mr. W. F. L. Tottenham, officiating Deputy Conservator of Forests, received charge of, the Rangoon Depôt and Agency division on the afternoon of the 7th April 1893.

9.—ASSAM GAZETTE.

The 21st April, 1893. No 4183 G—Privilege leave of absence for three months, under article 291 of the Civil Service Regulations, is granted to Mr. J. C. Kelly, Extra Assistant Conservator of Forests, in charge of the Nowgong Forest Division, with effect from the 1st May 1893, or the subsequent date on which he is relieved of his duties,

VIII.—EXTRACTS FROM OFFICIAL GAZETTES.

1.—Gazette of India.

7th April, 1893. No. 392-F.—The following changes are made consequent on the return from furlough of Mr. H. C. Hill, Conservator of Forests, 1st Grade, with effect from 18th March 1893:

Mr. Hill to be Conservator of the Central Forest Circle, North-Western Provinces and Oudh.

Mr. C. Bagshawe, Conservator, 2nd (officiating 1st) Grade, Central Forest Circle, North-Western Provinces and Oudh, to revert to his substantive grade.

Mr. P. J. Carter, Conservator, 3rd (officiating 2nd) Grade, Pegu Forest Circle, Lower Burma, to revert to his substantive grade.

7th April 1893. No 396-F.—With reference to the Notification of this Depatment, No. 339-F., dated the 17th ultimo, Mr. C. Bagshawe, Conservator of Forests, 2nd Grade, is appointed to be Conservator of the Berar Forest Circle, with effect from the date on which he may relieve Mr. F. B. Dickinson of the charge of that Circle.

19*th April*, 1893. No. 432 F—With reference to the Notification of this Department, No. 396-F., dated the 7th instant, Mr. Bagshawe assumed charge of the Berar Forest Circle on 31st March 1893, on which date Mr. Dickinson, Officiating Conservator, availed himself of the furlough granted him in Notification No 339-F., dated the 17th ultimo.

21*st April* 1893. No. 439-F. —Mr. Dansey, Conservator of Forests, 2nd Grade, Bengal, availed himself on 14th April 1893 of the privilege leave granted him in the Notification of this Department, No. 206-F., dated the 17th February last; and Mr. Chester's appointment as Officiating Conservator, 3rd Grade, Bengal, took effect from that date.

Mr. P. J. Carter, Conservator, 3rd Grade, Pegu Circle, Lower Burma, is appointed to officiate in the 2nd Grade of Conservators from the same date.

2—Madras Gazette.

28*th March*, 1893. No. 147.—

No.	Name and designation of officer.	Present grade.	Grade to which promoted.	Nature of promotion.	Remarks showing cause of vacancy,
1	Mr. E. R. Murray ...	Deputy Conservator of Forests, Fourth Grade.	Deputy Conservator of Forests, Third Grade.	Acting ..	With effect from 1st April 1893 (during the absence of Mr. Porter on furlough, or until further order).
2	Mr. P M. Lushington ...	Do. ...	Do. ...	Do. ...	With effect from 1st April 1892 (during the deputation of Mr. A. W. Lushington to act in the second grade, or until further orders).

24th March 1893.—To Ranger Balaji Singh for two month from date of relief, under article 291 of the Civil Service Regulation.

15th April 1893 *Posting and Results of* 1891 *Dehra Dun Students*—The following are the results for the Government students from the Southern Circle, who went up to the Dehra Dun School in 1891:—

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Mr. F. S. Brito, Forester on Rs 40, obtained the Higher Standard Certificate.

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APPENDIX SERIES

OF

THE INDIAN FORESTER.

[This product is described in Dr. Watt's Dictionary of Economic Products, Vol. VI., (Part II.), S. 910—918.]

KUT.

(THE COSTUS.)

In this hand-book the article in the Dictionary of Economic Products by Mr. W. R. Clark has been reproduced with a few modifications. Its object is to draw attention to a product, collected in Kashmír, which is exported to China and the Straits, where it is largely used as incense. It is also used to protect fabrics from the attacks of moths and other vermin, and from it Kashmír goods derive their peculiar odour.

Saussurea Lappa, *C. B. Clarke; Fl. Br. Ind., III., 376.*

THE COSTUS.

Syn.—AUCKLANDIA COSTUS, *Falc.*; APLOTAXIS LAPPA, *Dcne.*

Vern.—*Kút, kot, kust, kust-talk-putchuk, kur, pachak,* HIND.; *Pachak, kur,* BENG.; *Post-khai,* KASHMIR; *Rusta,* BHOTE; *Kút, kot, kúst talkh, kúth,* PB.; *Ouplate,* BOMB.; *Upaleta, kút,* GUZ.; *Kostum, putchuk, goshtam,* TAM.; *Changala, kustam,* TEL.; *Sepuddy,* MALAY.; *Goda mahanel,* SING.; *Kushtha, kashmirja* (according to Stewart), SANS.; *Kúst,* ARAB. & PERS.

Habitat.—A tall, very stout herb, with annual stem and thick perennial roots, indigenous to the moist, open slopes surrounding the valley of Kashmír, at an elevation of 8,000 to 9,000 feet. It occurs also in parts of the basins of the Chenab and Jhelam, at elevations between 10,000 and 13,000 feet. The roots are dug up in the months of September and October, chopped up into pieces, 2 to 6 inches long, and exported without further preparation.

Description.—"Costus occurs in crooked twisted pieces about 3 inches long, and from ½ to 1½ inch in diameter, almost always split. Externally it is brown, marked by longitudinal ridges, and has a rough and somewhat reticulated surface. Its substance is compact and brittle, the fractured surface having a resinous appearance and dirty white colour. The central portion is generally absent, and appears to have been removed by decay before the root was collected. The taste is bitter, pungent and camphoraceous; the odour resembles that of fresh violets or orris root." (*Pharm. Ind.*)

Chemical Composition.—According to the *Pharmacopœia Indica* the odorous principle of the drug appears to consist of two liquid resins, one of which possesses in a very marked degree the odour of the drug, and a somewhat camphoraceous taste, while the other possesses a musty odour. In addition to these resins evidence of an alkaloid, an astringent principle, and a solid resin has been obtained.

History.—Dr. Watt has already written at some length on this subject, and his remarks may therefore be reproduced:—"It would seem that for a long time Costus Root or *kust* was referred to a species of Scitamineæ, most probably from the resemblance of the scent to that of Orris root. The genus to which it was attributed received the name of Costus, the perfume being said to be obtained from *C. arabicus*, Willd. The common and elegant plant of our jungles, *Costus speciosus*, Sm., was supposed to be nearly allied to the hypothetical species *C. arabicus*, but to be scentless. It is remarkable that, while it has now been clearly proved that the plants which belong to the genus *Costus* have nothing to do with the Costus root of the ancients, the vernacular names *keo*, *kust*, should in Bengali be given to *C. speciosus*, names which are also applied to the true Costus. The resemblance of the root to Orris or Iris, a plant nearly allied to *Costus speciosus*, is another remarkable coincidence. Falconer, in *Linn Soc. Trans., Vol. XIX., Part I., 23* (*1842*), proved beyond doubt that the *kust* of Upper India was the root of what he called *Aucklandia Costus* (since reduced to *Saussurea Lappa*), and he concluded that this was the Costus of the ancients for the following reasons:—

"*1st*—It corresponds with the descriptions given by the ancient authors.

"*2nd*—Coincidence of names. In Kashmír the root is called *kút* and the Arabic vernacular is said to be *kust*, both being given as synonyms by the Persian *hakims*; they are also the names by which the medicine is known in all the bazárs of Hindústan Proper. In Bengal the Kashmír root is called *Patchak*, and it appears by a note in Dr. Royle's illustrations that Garcia ab Horto gives *Pucho* as the Malay synonym of *Costus arabicus*.

"*3rd*—*Koot* is used at the present day for the same purposes in China as Costus was formerly applied to by the Greeks and Romans.

"*4th*—The direct testimony of the Persians that *kust* comes from the borders of India, and that it was not a product of Arabia.

"*5th*—The commercial history of the root gathered in Kashmír under the name of *kust.*" (*Dr. Dymock, Mat. Med.*)

"This root is collected in enormous quantities in the mountains of Kashmír, whence it is conveyed to Calcutta and Bombay, and thence shipped for China. The drug has a pungent, aromatic taste, and an odour resembling that of Orris root. There is an excellent account of it, with a figure, in Professor Guibourt's *Histoire des Drogues*, tome iii. p. 25. (*Science Papers by D. Hanbury, 257.*) Costus root is remarkably similar to Elecampane both in external appearance and structure. Costus has been an important spice, incense, and medicine in the East from antiquity down to the present day; it would be of great interest to examine it chemically with regard to Elecampane." (*Pharmacographia.*)

Kust is collected in large quantities in Kashmír and exported to the Panjáb, where it finds its way all over India and is shipped from Bombay and Calcutta to China and the Red Sea, a small quantity finding its way to Europe. Falconer describes two forms—*kust-i-talk* and *kust-i-shírín*, the latter being the chief article of commerce. (*Watt, Calcutta Exhib. Cat., V., 252.*)

Uses.—As already indicated, the roots are a valuable perfume, and yield excellent pastilles, which burn fairly. Stewart remarks that the loads of roots when passing scent the air to some distance. "It is," Baden Powell writes, "exported in enormous quantities to China, where it is used as an incense. In every Hong it is found; no mandarin will give

an audience until the *patchak* incense smokes before him; in every Joss house it smoulders before the Tri-budh deity; in every floating junk in the Chinese rivers, the only house of countless hordes, Budh's image is found, and the smoke of the *patchak* religiously wends its way heavenward."

The root is largely used as a hair-wash, and is said to have the power of turning grey hair black. Formerly, when opium was not produced in Rajwarra, it was extensively smoked as a stimulant, and great quantities also went to China for smoking purposes. It is universally employed, according to Baden Powell, by Kashmír shawl-merchants as a protector of their fabrics from the attacks of moths and other vermin. Kashmír goods owe their peculiar odour to it. It is brought into Bengal by Panjábi and Marwari merchants, and retailed by spice-sellers.

Carminative, astringent, sedative, and prophylactic properties have been referred to the root. The Chinese apply it with musk to aching teeth. Stewart says that it is officinal in the Panjáb, being applied in powder to ulcers, for worms in wounds, and for toothache and rheumatism. Baden Powell says that it is used as an ingredient in a stimulating mixture for cholera.

Trade.—The quantity collected is very large, amounting, according to Dr. Falconer, to about 2,000,000 pounds per annum. It is laden on bullocks and exported to the Panjáb, whence the greater portion is sent to Bombay and Calcutta. A great part of the imports into Bombay and Calcutta is exported to China and the Red Sea. In Kashmír it is a Government monopoly; each village in the vicinity of the *kut* fields is assessed at a fixed amount which has to be delivered in the capital, and the surplus is bought up by the agents of the Maharája and retailed again to dealers for export to Hindústan. In 1864 the revenue, obtained by the Kashmír State from the sale of *kut*, was said to have amounted to nearly ₹1,90,000. According to Dr. Falconer, at the time he wrote, the cost of collection and transport to a depôt in Kashmír was 2*s.* 4*d.* per cwt.; on entering India its value was enhanced to from 16*s.* 9*d.* to 23*s.* 4*d.* per cwt., while its commercial value at Canton was 47*s.* 5*d.* per cwt.

At the present day from 7,000 to 11,000 cwts. of the roots are, on an average, shipped annually from Calcutta for the use of the Chinese and Japanese, and the consumption could be increased if the roots could be obtained at a cheap rate. The price varies from ₹20 to ₹25 per cwt.

The following were the exports of the roots from Bombay during 1891:—

To China (Hong-Kong)	3,200 cwts.
„ The Straits (Penang and Singapore) . .	237 „
	3,437

Adulteration.—As regards the adulteration of the roots it is stated in the *Pharmacographia Indica* that "the natives of Kashmír say that this drug is apt to be adulterated with five or six other kinds of roots. In 1859 a communication was made to the Agri-Horticultural Society of India of two roots, one called *kút* and the other *thúth*. They were from the hills of the Kangra district bordering on Chumba. The *kút* was identified as the Costus, and the *thúth* was believed to be the root of *Salvia lanata*, which was said to be common also in Kashmír, where it is used to adulterate *kút*. Subsequently Mr. H. Cope of Amritsar contributed some remarks to the same Society on the adulterations of this drug. "This adulteration," he says, "is now (1860) carried to such a pitch with the assistance not only of the *tút* (which so closely resembles the

genuine article in every respect but its qualities that it is difficult to distinguish the one from the other after admixture, which imparts to the false the odour of the true drug), but with other foreign substances (of which cow-dung is one) that I have ascertained as a fact that the more unscrupulous dealers use some 10lb of the *kút* to flavour 50lb of trash. I am told that two other substances, resembling the genuine article in exterior appearance, have been ascertained to serve as ingredients in the mixture sent to Calcutta and Bombay for exportation to China under the name of *patchak*. They are a root called *chog*, brought from the hills, which is generally reported to be a deleterious drug, and *nirbisí*, the root of a species of Aconitum,* probably a virulent poison. With regard to Mr. Cope's remarks, we may mention that there is no difficulty in obtaining genuine parcels of Costus in Bombay. Perhaps the adulterated article may be specially prepared for the China market."

In Bengal *kút* is adulterated with the root of *Lagenaria vulgaris* (Bottle Gourd). When this plant is mature, the root and a portion of the stem are cut into small pieces, which are steeped for some time in an infusion of real *kút*. In this way they are so saturated with the smell of the *kút* that it is difficult to distinguish them from the genuine article. The only way to distinguish them is to cut them with a knife. The true *kút* roots cut sharp and clean, whereas those of the gourd present a lacerated surface.

EDGAR THURSTON,
Offg. Reporter on Economic Products
to the Government of India.

* In the Dictionary of Economic Products the principal adulterants are said to seem to be a species of *Ligularia* and one of *Aconitum*.

Government of India Central Printing Office.—No. 631 R. & A.—9-2-93.—1,5000.—H.R.